AD-A103 939 NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON --ETC F/G 13/13
NATIONAL DAM SAFETY PROGRAM. BLAIR LAKE DAM (NJ00774), DELAWARE--ETC(U)
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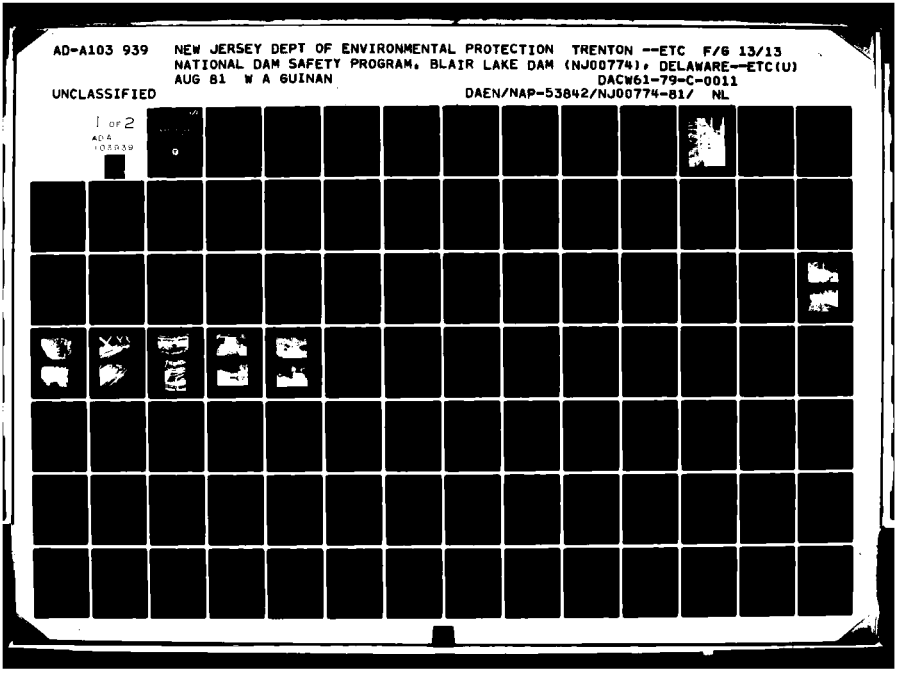

DELAWARE RIVER BASIN
BLAIR CREEK, WARREN COUNTY
NEW JERSEY

BLAIR LAKE DAM
NJ 00774

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

DEPARTMENT OF THE ARMY
Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

REPT. NO: DAEN/NAP-53842/NJ00774-81/08

AUGUST 1981

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: DAEN/NAP/53842/NJ00774-81/08	2. GOVT ACCESSION NO.: AD-A103 939
3. RECIPIENT'S CATALOG NUMBER:	
4. TITLE (and Subtitle): Phase I Inspection Report National Dam Safety Program. Blair Lake Dam (NJ00774), Warren County, New Jersey.	5. TYPE OF REPORT & PERIOD COVERED: Final
	6. PERFORMING ORG. REPORT NUMBER:
7. AUTHOR(s): Guinan, Warren, P.E.	8. CONTRACT OR GRANT NUMBER(s): DACW61-79-C-0011
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Anderson-Nichols 150 Causeway St. Boston, MA 02114	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS:
11. CONTROLLING OFFICE NAME AND ADDRESS: NJ Department of Environmental Protection Division of Water Resources P.O. Box CN029 Trenton, NJ 08625	12. REPORT DATE: August, 1981
	13. NUMBER OF PAGES: 50
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office): U.S. Army Engineer District, Philadelphia Custom House, 2d & Chestnut Streets Philadelphia, PA 19106	15. SECURITY CLASS. (of this report): Unclassified
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE:

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Copies are obtainable from National Technical Information Service, Springfield, Virginia 22151.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dams	National Dam Safety Program
Embankments	Blair Lake Dam, NJ00774
Visual Inspection	Spillways
Structural Analysis	Seepage

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO

NAPEN-N

31 AUG 1981

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Blair Lake Dam in Warren County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Blair Lake Dam, a high hazard potential structure, is judged to be in fair overall condition. The spillway is considered seriously inadequate since a flow equivalent to 5 percent of the Probable Maximum Flood (PMF) would cause the dam to be overtopped. The seriously inadequate spillway is assessed as an UNSAFE, non-emergency condition, until more detailed studies prove otherwise or corrective measures are completed. The classification of UNSAFE applied to a dam because of a seriously inadequate spillway is not meant to indicate the same degree of emergency as would be associated with an UNSAFE classification applied for a structural deficiency. It does mean, however, that based on an initial screening, and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard of loss of life downstream from the dam. To ensure adequacy of the structure, the following actions, as a minimum, are recommended.

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval

D

of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated. In the interim, a detailed emergency operation plan and warning system should be promptly developed. Also, during periods of unusually heavy precipitation, around the clock surveillance should be provided.

b. Within six months of the date of approval of this report the owner should engage a qualified professional consultant to perform the following:

(1) Design and oversee installation of a properly sized low-level outlet and gate.

(2) Design and oversee procedures for the removal of trees and root systems from immediately upstream and downstream of the dam.

(3) Evaluate the potential for undermining of the abutment support at the right side of the dam owing to the loss of several large bedrock blocks.

(4) Design and oversee procedures for elimination of the seepage through the stone masonry in the spillway.

(5) Design and oversee repair or replacement to the service bridge trusses and wood deck.

c. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam, within one year from the date of approval of this report.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Courter of the Thirteenth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

NAPEN-N
Honorable Brendan T. Byrne

An important aspect of the Dam Inspection Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,

ROGER L. BALDWIN
Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

Incl
As stated

Copies furnished:
Mr. Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief
Bureau of Flood Plain Regulation
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

BLAIR LAKE DAM (NJ00774)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 22 April 1981 by Anderson-Nichols & Co., Inc. under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Blair Lake Dam, a high hazard potential structure, is judged to be in fair overall condition. The spillway is considered seriously inadequate since a flow equivalent to 5 percent of the Probable Maximum Flood (PMF) would cause the dam to be overtopped. The seriously inadequate spillway is assessed as an UNSAFE, non-emergency condition, until more detailed studies prove otherwise or corrective measures are completed. The classification of UNSAFE applied to a dam because of a seriously inadequate spillway is not meant to indicate the same degree of emergency as would be associated with an UNSAFE classification applied for a structural deficiency. It does mean, however, that based on an initial screening, and preliminary computations, there appears to be a serious deficiency in spillway capacity so that if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard of loss of life downstream from the dam. To ensure adequacy of the structure, the following actions, as a minimum, are recommended.

a. The spillway's adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures and studies within six months from the date of approval of this report. Within three months of the consultant's findings remedial measures to ensure spillway adequacy should be initiated. In the interim, a detailed emergency operation plan and warning system should be promptly developed. Also, during periods of unusually heavy precipitation, around the clock surveillance should be provided.

b. Within six months of the date of approval of this report the owner should engage a qualified professional consultant to perform the following:

(1) Design and oversee installation of a properly sized low-level outlet and gate.

(2) Design and oversee procedures for the removal of trees and root systems from immediately upstream and downstream of the dam.

(3) Evaluate the potential for undermining of the abutment support at the right side of the dam owing to the loss of several large bedrock blocks.

(4) Design and oversee procedures for elimination of the seepage through the stone masonry in the spillway.

(5) Design and oversee repair or replacement to the service bridge trusses and wood deck.

c. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam, within one year from the date of approval of this report.

APPROVED: Roger L. Baldwin

ROGER L. BALDWIN
Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

DATE: 31 Aug 81

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Blair Lake
Identification No.:	Fed ID No. NJ00774
State Located:	New Jersey
County Located:	Warren
Stream:	Blair Creek
River Basin:	Delaware
Date of Inspection	April 22, 1981

ASSESSMENT OF GENERAL CONDITIONS

Blair Lake Dam is a 78-year old dam with an ashlar masonry spillway with earthen and bedrock abutments, is 100 feet long and 18.3 feet high, and is in fair condition. It is small in size and has a high hazard classification. Large trees are growing on the abutments and some of their roots have been instrumental, in part, in causing undermining of the bedrocks on the downstream side of the right abutment. Some seepage was observed through the stone masonry of the spillway below the water line near the right and left sides of the spillway. Erosion has exposed tree roots on the right abutment upstream and the left abutment also shows signs of erosion. In 1960 to seal seepage areas, large amounts of clay and lake-bottom sediments were placed in various locations, including along the upstream spillway toe and the left abutment. The service bridge would be a cause for concern should the dam be overtopped. The bridge, whose low chord elevation at the abutments is slightly below that of top of dam, is rusted and corroded. The dam has no low-level outlet as it was built with a mill race to a downstream millbuilding. The old mill race has been filled and the intake gate at the mill appeared to be inoperable.

The spillway is 41 feet long and 4 feet wide. Overtopping or breaching of Blair Lake Dam would cause excessive property damage to the library and Main Street Bridge and probably would result in damage to 4 or 5 houses 300 feet downstream of the Main Street Bridge as well as the loss of 10 to 20 lives. Therefore the dam is classified high hazard.

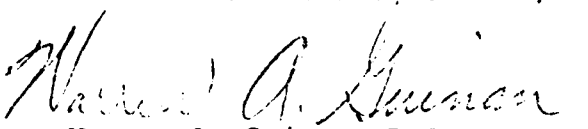
The spillway is capable of passing 984 cfs at the top of dam or about 4.6 percent of the 21,554 cfs peak inflow from the Probable Maximum Flood (PMF), which is the selected spillway design flood (SDF). The PMF would overtop the dam by 11 feet for up to 15 1/2 hours. The spillway is not capable of passing 50 percent of the 1/2 PMF (10, 777 cfs inflow) without

overtopping (7.6 feet) which would cause failure. (Failure would probably occur with one to two feet of overtopping.) Dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure. The stage would increase from 7.1 feet to 9.8 feet in about 25 minutes upon failure with one foot of overtopping. Therefore, the spillway is considered to be seriously inadequate.

It is recommended that the owner retain the services of a professional engineer, qualified in the design and inspection of dams, to accomplish the following tasks in the near future: investigate the seriously inadequate spillway capacity and implement remedial measures indicated; design and oversee installation of a properly sized low level outlet and gate; Design and oversee procedures for the removal of trees and root systems from immediately downstream of the dam; evaluate the potential for undermining of the abutment support at the right side of the dam owing to the loss of several large bedrock blocks; design and oversee procedures for elimination of the seepage through the stone masonry in the spillway; and design and oversee repair or replacement to the service bridge trusses and wood deck.

It is futher recommended that the owner undertake the following as a part of operating and maintenance procedures starting soon: develop an emergency action plan which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam. In the near future: develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

ANDERSON-NICHOLS & COMPANY, INC.



Warren A. Guinan, P.E.
Project Manager
New Jersey No. 16848

April 22, 1981

OVERVIEW PHOTO

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonable possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

CONTENTS

PHASE I INSPECTION REPORT
BLAIR LAKE DAM SAFETY REPORT

BLAIR LAKE DAM FED ID NO. NJ00774 NJ NO. 21-11

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY INSPECTION PROGRAM
BLAIR LAKE DAM
FED ID NO. #NJ00774

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. Authority to perform the Phase I Safety Inspection of Blair Lake Dam was received from the State of New Jersey, Department of Environmental Protection, Division of Water Resources by letter dated 12 December 1980 under Basic Contract No. FPM-39 and Contract No. A01093 dated 10 October 1979. This Authority was given pursuant to the National Dam Inspection Act, Public Law 92-367 and by agreement between the State and the U.S. Army Engineers District, Philadelphia. The inspection discussed herein was performed by Anderson-Nichols & Company, Inc.

b. Purpose: The purpose of the Phase I Investigation is to develop an assessment of the general conditions with respect to the safety of Blair Lake Dam and appurtenances. Conclusions are based upon available data and visual inspection. The results of this study were used to determine any need for emergency measures and to conclude if additional studies, investigations, and analyses are necessary and warranted.

1.2 Project Description

a. Description of Dam and Appurtenances. Blair Lake Dam is an ashlar stone masonry dam tied to earthen and rock abutments 100 feet long with a hydraulic and structural height of 18.3 feet. The masonry spillway is 41 feet long with a topwidth of 4 feet. On the left (east) side of the spillway is a 39-foot earthen abutment and on the right (west) side is a 20 foot bedrock and earth abutment; both abutments are 4 feet higher than the spillway. The upstream and downstream slopes of the dam are tree-covered and of varying slope. On the right (west) side of the right abutment, extending approximately 200 feet downstream, is the east bank of an old mill race (diversion channel), which provided water power for a flour mill. The mill is no longer operating and the mill gate is assumed inoperable. The mill race has been filled to prevent flow to the mill building.

b. Location. Blair Lake Dam is located on Blair Creek in Blairstown Township, Warren County, New Jersey. The dam is at 40° 59.0' north latitude 74° 57.6' west longitude on the Blairstown Quadrangle. A location map has been included as Figure 2. The site may be reached by driving on Main Street northward from U.S. Route 94.

c. Size Classification. Blair Lake Dam is classified as being small in size on the basis of storage at the dam crest of 60 acre-feet, which is less than 1000 acre-feet but more than 50 acre-feet, and on the basis of its height of 18.3 feet, which is less than 40 feet, in accordance with criteria given in the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification. The potential is present for excessive economic damage to the mill building (now the Catherine Dickson Hofman Public Library), Main Street Bridge, and 4 to 8 houses within 400 to 800 feet downstream of the dam. These structures are built along the rock-wall, lined channel of Blair Brook. With the potential loss of 12 to 20 lives in event of overtopping and/or breach, Blair Lake Dam is classified High Hazard.

e. Ownership. The dam is owned by the Blair Academy, Mr. J. Ernest Rea, Treasurer of Blairstown Academy, Blairstown, N.J. 07825 can be contacted for information at the above address or by calling (201) 362-6121.

f. Purpose. Blair Lake Dam was built to provide water power to a flour mill downstream. It is presently used for recreation.

g. Design and Construction History. Memoirs of Blair, a privately printed document published in 1939 indicates that the dam was built in 1902-03 to provide water power for the flour mill downstream. The memoirs were written by John C. Sharpe, who supervised the reconstruction. Mr. Rea, Treasurer of Blairstown Academy, said that the upstream side of the dam was sealed by Lawrence McConachy Construction Co. in 1960 with 1,500 cubic yards of clay and lake-bottom sediments along the spillway and the left embankment. The old headrace had a concrete cut-off placed in it and backfilled to its present height (See Appendix 2).

h. Normal Operational Procedure. No operational procedures were found for the dam.

i. Site Geology. No site specific geologic information (such as borings) was available at the time the dam was inspected. Information derived from the Geologic Map of New Jersey (Kummel and Johnson, 1912) and the Glacial Drift of New Jersey (Salisbury, Kummel, Peet and Whitson, 1902) indicates soils within the immediate site consist of stratified drift which may be comprised of sand and gravel plains, deltas, eskers, kames, and terraces.

Bedrock (massive limestone) was observed in large outcrops at the right side of the downstream channel during inspection. The previously mentioned geologic map indicates that bedrock in this area consists of massive to thin bedded limestone of Cambrian to Ordovician age.

1.3 Pertinent Data

a. Drainage Area

10.85 square miles

b. Discharge at Damsite (cfs)

Maximum flood at damsite - unknown.

Total ungated spillway capacity at maximum pool (top of dam) elevation - 984

c. Elevation (ft. above NGVD)

Top of dam - 359.0

Maximum pool test flood (PMF) - 370

Recreation pool (at time of inspection) - 355

Spillway crest - 355

Streambed at centerline of principal spillway - 340.7

Maximum tailwater (estimated) - 346.5

d. Reservoir (Length in feet)

Maximum pool - 2000 (estimated)

Spillway crest - 700

e. Storage (acre-feet)

Spillway crest - 24

Top of dam - 60

Test flood - (PMF) - 236

f. Reservoir Surface (acres)

Top of dam - 12 (estimated)

Spillway crest - 4.3

g. Dam

Type - Ashlar masonry with earth and bedrock abutments

Length - 100 feet

Height - 18.3 feet (hydraulic)

- 18.3 feet (structural)

Top width - 4-foot spillway; varies up to 15 feet on earthen abutments

Side slopes - upstream vertical; downstream 1H:3V (slopes apply to spillway and masonry portion only) slopes on earthen abutment vary.

Zoning - unknown

Impervious core - unknown

Cutoff - unknown

Grout curtain - unknown

h. Spillway

Type - Broad crested, Ashler masonry

Length of weir - 41 feet

Crest elevation - 355 feet NGVD

Low level outlet - none present

U/S channel - Blair Lake and Blair Creek

D/S channel - Blair Creek

SECTION 2
ENGINEERING DATA

2.1 Design

No hydraulic, hydrologic, or other design engineering data were disclosed.

2.2 Construction

As noted above in Section 1.2.g., Memoirs of Blair indicate that the dam was built in 1902-03 under supervision of Dr. John C. Sharpe and paid for by D.C. Blair, son of John I. Blair, founder of Blairstown, N.J. at a cost of $15,000. The upstream side of the spillway and left embankment were sealed with 1,500 cubic yards of clay and lake-bottom sediments in about 1960 by Lawrence McConachy Construction Company. Owner's representative stated that a concrete cut-off was placed in the mill's headrace before backfilling to preclude flowing water through the mill. Dampness was causing mildew in the library.

2.3 Operation

No data pertaining to the operation of the dam were found.

2.4 Evaluation

a. Availability. A search of the New Jersey Department of Environmental Protection files, and contact with community officials revealed a limited amount of information.

b. Adequacy. The information retrieved is inadequate to evaluate; however, the visual inspection is deemed adequate to complete this Phase I Inspection Report.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. Dam. The left abutment is eroded. Undermining of some of the large rock outcrops of limestone downstream of the right abutment of the dam has occurred. Trees are growing upstream of the dam at the right and downstream of the dam at both abutments. Evidence of seepage through the masonry joints was noted on both right and left sides of the downstream face of the spillway below the waterline.

b. Appurtenant Structure. Service bridge: major corrosion of the bottom chord joint gusset plates has substantially reduced the effectiveness of the bridge truss. The wood deck planking is weathered with several planks observed to be deteriorated.

c. Reservoir Area. The watershed above the lake is gently to moderately sloping, wooded, and is partially urbanized. Some open fields exist along the right side of the reservoir. Slopes on the shore appear to be stable. No evidence of significant sedimentation was observed in the reservoir. However, sediment at the upstream face of the dam reaches nearly to the crest of the spillway. This is the result of the action taken about 1960 to place clay and lake-bottom sediments at the upstream toe of the spillway and left abutment to seal the leaks in the dam.

d. Downstream Channel. Some erosion and displacement of the vertical masonry block walls along the right and left side of the channels downstream of the dam has occurred. Trees are growing on the left bank of the channel downstream of the spillway. One large tree is leaning into the channel approximately 100 ft downstream of the dam.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures

No formal operating procedures were disclosed.

4.2 Maintenance of Dam

No formal maintenance procedures for the dam were found, but from its condition, it is apparent that maintenance is needed to prevent serious deterioration of the structure.

4.3 Maintenance of Operating Facility

No formal maintenance procedures for the operating facilities were found.

4.4 Warning System

No description of any warning system was disclosed.

4.5 Evaluation of Operational Adequacy

Because of the lack of operation and maintenance procedures, the remedial measures described in Section 7.2 should be implemented as prescribed.

SECTION 5
HYDROLOGIC/HYDRAULIC

5.1 Evaluation of Features

a. Design Data. Because no hydrologic or hydraulic data were revealed an evaluation could not be performed.

b. Experience Data. No experience data were found.

c. Visual Observation. The spillway appears to be in good condition. At the left spillway abutment downstream, the bedrock is seriously undermined in part, caused by tree roots that have spread along the joint planes. The dam now has no low-level outlet; the old mill race has been blocked off and the gate in the mill building is closed and presumed to be inoperable. Because the low chord of the bridge is just below top of dam, the condition of the bridge is important in the event of overtopping. The poor structural condition of the trusses, caused by corrosion, makes the bridge a liability to the integrity of the dam if it should collapse.

d. Blair Lake Overtopping Potential. The hydraulic/hydrologic evaluation for the dam is based on a selected Spillway Design Flood (SDF) equal to the Probable Maximum Flood (PMF) in accordance with the range of test floods given in the evaluation guidelines, for dams classified as High Hazard and small in size. The PMF was determined by application of the SCS dimensionless unit hydrograph to a 24-hour probable maximum precipitation of 22.2 inches. Hydrologic computations are given in Appendix 3. The routed PMF peak discharge for the subject drainage area is 21,554 cfs.

The minimum elevation of the dam allows 2.9 feet of depth above the spillway, before overtopping occurs. Under this head the total spillway capacity is 984 cfs, which is less than the selected SDF inflow (approximately 4.6 percent).

Flood routing calculations indicate that Blair Lake Dam will be overtopped for 15.5 hours to a maximum depth of 11 feet under PMF conditions. It is estimated that the spillway can pass about 4.6 percent of the peak PMF inflow without overtopping the dam.

Bank full condition downstream, which occurs at incipient overtopping, is about 5 to 6 feet. If the dam were to fail at overtopping, a significant increase (3.6 feet) in downstream flood stage would occur at the damage center. Failure with a stage one foot above the dam crest is likely, and would increase the downstream stage by 2.7 feet, causing an increase

to the hazard of loss of life in Blairstown. Since the one-half PMF would overtop the dam by 7.6 feet, more than needed to cause failure, the spillway capacity is seriously inadequate.

e. Drawdown Capability. Since the mill headrace was filled, no drawdown capability has existed at Blair lake Dam.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability. Trees growing immediately upstream of the dam may cause seepage if their root systems penetrate and dislodge the masonry blocks in the dam. Several large blocks of bedrock which have been displaced on the right abutment downstream of the dam may cause stability problems at the right abutment.

Based on visual insection alone, it is not possible to determine the character of the dam foundation or the interior of the cross section. Therefore, it is not possible to evaluate the factor of safety of the dam against slope failure, sliding or overturning.

6.2 Design and Construction Data. No design or construction data pertinent to the structural stability of the dam are available.

6.3 Operating Records. No operating records pertinent to the structural stability of the dam were available.

6.4 Post-Construction Changes. No record of post-construction changes was available; however, Mr. Rea indicated that in about 1960, a total of 1,500 cubic yards of clay and lake-bottom sediments was placed along the upstream toe of the spillway and left embankment.

6.5 Seismic Stability. This dam is in Seismic Zone 1. According to the Recommended Guidelines, dams located in Seismic Zone 1 "may be assumed to present no hazard from earthquake provided static stability conditions are satisfactory and conventional safety margins exist." None of the visual observations made during the inspection are indicative of unstable slopes. However, because no data are available concerning the engineering properties of the embankment and foundation materials for this dam, it is not possible to make an engineering evaluation of the stability of the slopes or the factor of safety under static conditions.

SECTION 7
ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. Blair Lake Dam is 78 years old and is in fair condition.

b. Adequacy of Information. The information available is such that the assessment of the dam must be based primarily on the results of the visual inspection.

c. Urgency. The recommendations made in 7.2.a and 7.2.b should be implemented by the owner as prescribed.

d. Necessity for Additional Data/Evaluation. The information available from the visual inspection is adequate to identify the potential problems which are listed in 7.2.a. These problems require the attention of a professional engineer who will have to make additional engineering studies to design or specify remedial measures to rectify the problems. If left unattended, the problems could lead to failure of the dam.

7.2 Recommendations/Remedial Measures

a. Recommendations. The owner should retain a professional engineer qualified in the design and construction of dams to accomplish the following in the near future:

1. Investigate the seriously inadequate spillway capacity and design, and implement remedial measures indicated.

2. Design and oversee installation of properly sized low-level outlet and gate.

3. Design and oversee procedures for the removal of trees and root systems from immediately upstream and downstream of the dam.

4. Evaluate the potential for undermining of the abutment support at the right side of the dam owing to the loss of several large bedrock blocks.

5. Design and oversee procedures for elimination of the seepage through the stone masonry in the spillway.

6. Design and oversee repair or replacement to the service bridge trusses and wood deck.

7. Consider the provision of a low level outlet.

b. Alternatives. None recommended.

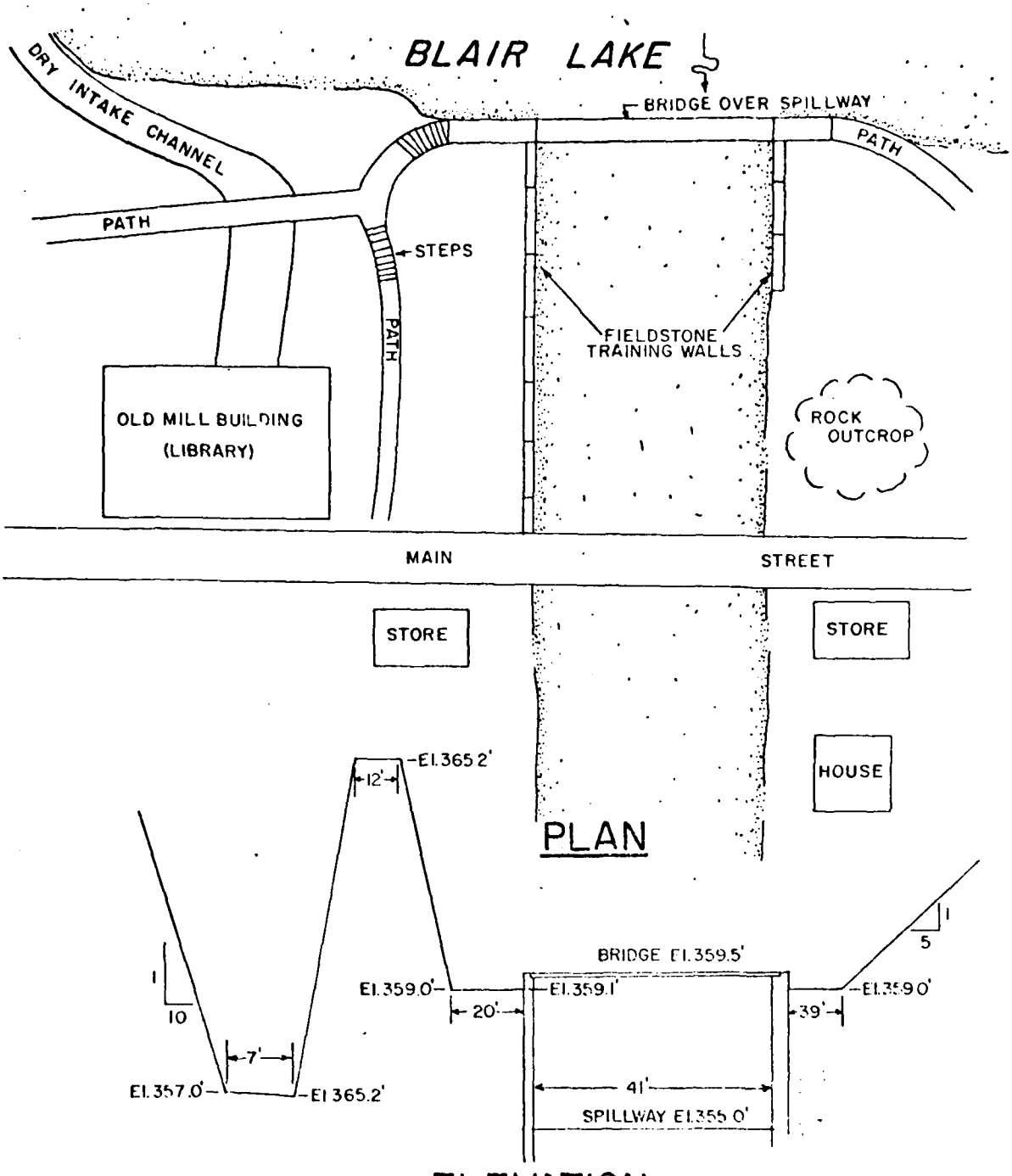
c. Operating and Maintenance Procedures

The owner should accomplish the following items soon:

Develop an emergency action plan which outlines actions taken by the owner to minimize downstream effects of an emergency at the dam.

The owner should do the following in the near future:

Develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.



Anderson-Nichols & Co, Inc	U.S. ARMY ENGINEER DISTRICT, PHILADELPHIA
BOSTON MASSACHUSETTS	CORPS OF ENGINEERS PHILADELPHIA, PA

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

BLAIR LAKE DAM

BLAIR CREEK NEW JERSEY

SCALE NOT TO SCALE

DATE JUNE 1981

FIGURE 1

Anderson-Nichols & Co., Inc. BOSTON MASSACHUSETTS	U.S. ARMY ENGINEER DIST. PHILADELPHIA CORPS OF ENGINEERS PHILADELPHIA, PA.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

SCALE IN MILES

0 4 8

BLAIR LAKE DAM
LOCATION MAP

MAP BASED ON STATE OF NEW JERSEY OFFICIAL MAP & GUIDE.

BLAIR CREEK NEW JERSEY

SCALE: 1" = 4 Miles Approx.

DATE: JUNE 1981

APPENDIX 1

CHECK LIST

VISUAL INSPECTION

BLAIR LAKE DAM

Check List
Visual Inspection
Phase 1

Name Dam Blair Lake Dam County Warren State NJ00774 Coordinators NJDEP

Date(s) Inspection 2-18-81, 4-27-81 Weather Fair, mild, Clear Temperature 45°, 65°

Pool Elevation at Time of Inspection 355.2' NGVD Tailwater at Time of Inspection 342' NGVD

Inspection Personnel:

W. Guinan
S. Gilman
R. Murdock
F.D.Deane
K. Stuart

R. Murdock/F.D.Deane Recorder

Mr. J. Ernest Rea, Treasurer of Blairstown Academy, dam owners, accompanied the inspection team.

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SEEPAGE OR LEAKAGE	Water flowing over spillway - unable to inspect for seepage.	Inspect during no flow condition over spillway.
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Some rock blocks have been displaced on right abutment in vicinity of downstream face of dam. Erosion adjacent to toe of dam on left side.	Restore and/or replace blocks of rock and repair erosion.
DRAINS	Not visible	
WATER PASSAGES	Not visible	
FOUNDATION	Appears to be bedrock on right side of dam. Not visible on left side of dam.	

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
STONE MASONRY WEIR	Numerous horizontal cracks noted in top walkway. Concrete cap visible on both sides of bridge, but not visible on central section. 4 ft. wide mortared cut stone cap; covered with algae, but appears to be in good condition. No indication of vertical or horizontal movement. Small amount of mortar missing on d/s joints. Some seepage is apparent on both sides near top of weir.	
APPROACH CHANNEL	Clear and unobstructed.	
DISCHARGE CHANNEL	Clear wide and unobstructed. Bound by dry cut stone walls approx. 5 ft.- 7 ft. high which train steam to bridge approx. 90 yards d/s. (Main Street of Blairstown). D/s training walls missing on both sides for approx. 15 ft. d/s of dam.	
BRIDGE AND PIERS OVER SPILLWAY	Bridge is set on mortared cut stone spillway abutments, no piers. It is constructed of steel channels bolted together w/channel cross members & a wooden plank deck which is worn but solid. Railings also along approaches to bridge. Moderate weathered wood plank deck. Wrought iron gusset plates badly corroded. Wrought iron is pitted. One section of railing	Investigate impact of corrosion and make repairs.

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	NA	
INTAKE STRUCTURE	NA	
OUTLET PIPE	None observed	
OUTLET CHANNEL	NA	
EMERGENCY GATE	None observed	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Gradual to moderately sloped, some wooded areas, open grassed area.	
SEDIMENTATION	Appears to be appreciable sedimentation below the reservoir surface in front of the dam.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Clear, unobstructed, training walls, steep valley on left d/s bank and Library on right would confine flow.	
SLOPES	Steep.	
APPROXIMATE NO. OF HOMES AND POPULATION	Up to 8 homes and businesses. Population affected 20 - high hazard. Blairstown business district affected by breach of dam. Flow would divert around railing of Main St. bridge and former mill (now Town Library)	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	None found
REGIONAL VICINITY MAP	Prepared for this report.
CONSTRUCTION HISTORY	Memoirs of Blair indicate the dam was built between 1902-03. Upstream side was sealed with 1,500 cubic yards of clay and earth along the spillway and the left embankment in 1960.
TYPICAL SECTIONS OF DAM	None found
HYDROLOGIC/HYDRAULIC DATA	None found
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	None found
RAINFALL/RESERVOIR RECORDS	None found

ITEM	REMARKS
DESIGN REPORTS	None found
GEOLOGY REPORTS	None found
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None found
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None found
POST-CONSTRUCTION SURVEYS OF DAM	None found
BORROW SOURCES	Unknown

ITEM	REMARKS
MONITORING SYSTEMS	None found
MODIFICATIONS	Memoirs of Blair see "CONSTRUCTION HISTORY"
HIGH POOL RECORDS	None found
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None found
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None found
MAINTENANCE OPERATION RECORDS	None found

ITEMS	REMARKS
SPILLWAY PLAN	
SECTIONS	None found
DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS	None found

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 10.85 square miles, moderate slope, wooded

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 355' NGVD (24 acre-feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY) Not applicable

ELEVATION MAXIMUM TEST FLOOD POOL: 370' NGVD

ELEVATION TOP DAM: 359.0' NGVD

SPILLWAY CREST: Uncontrolled masonry

a. Elevation 355' NGVD

b. Type Broad crested

c. Width 4 feet

d. Length 41 feet

e. Location Spillover Right center of dam

f. Number and Type of Gates None

OUTLET WORKS: None

HYDROMETEOROLOGICAL GAGES: None

MAXIMUM NON-DAMAGING DISCHARGE: 984 cfs

APPENDIX 2

PHOTOGRAPHS

BLAIR LAKE DAM

April 22, 1981

View looking at right upstream dam and spillway abutment; upsloping berm is left bank of old mill race. Note erosion and growth of large trees with roots exposed adjacent to dam.

February 18, 1981

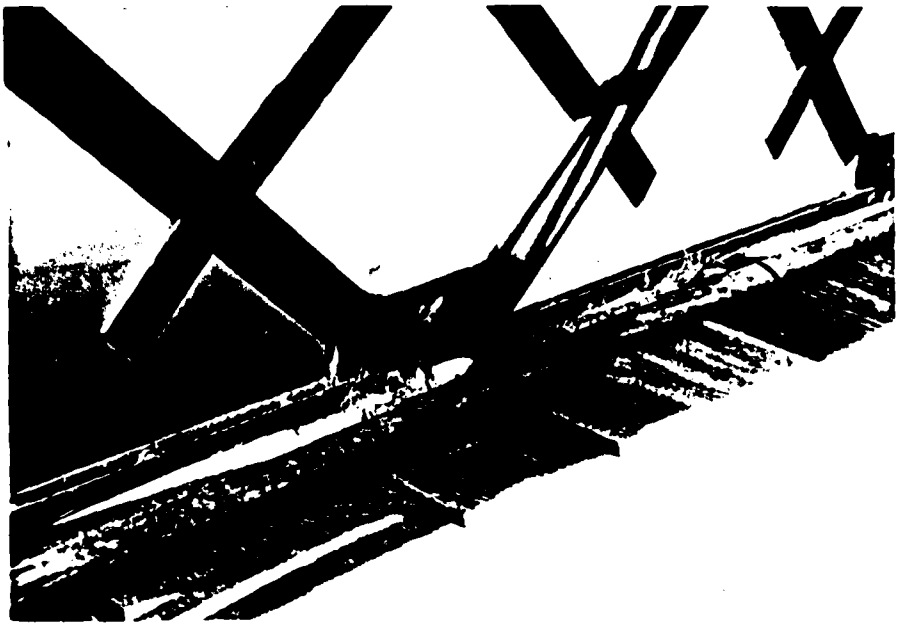
View looking in downstream direction along axis of old mill race; roof of old mill building (now a public library) is just above arched bridge.

April 22, 1981

View of downstream left spillway abutment contact; note trees up to 14-inch diameter on slope, erosion, debris, and portions of lined downstream channel wall missing.

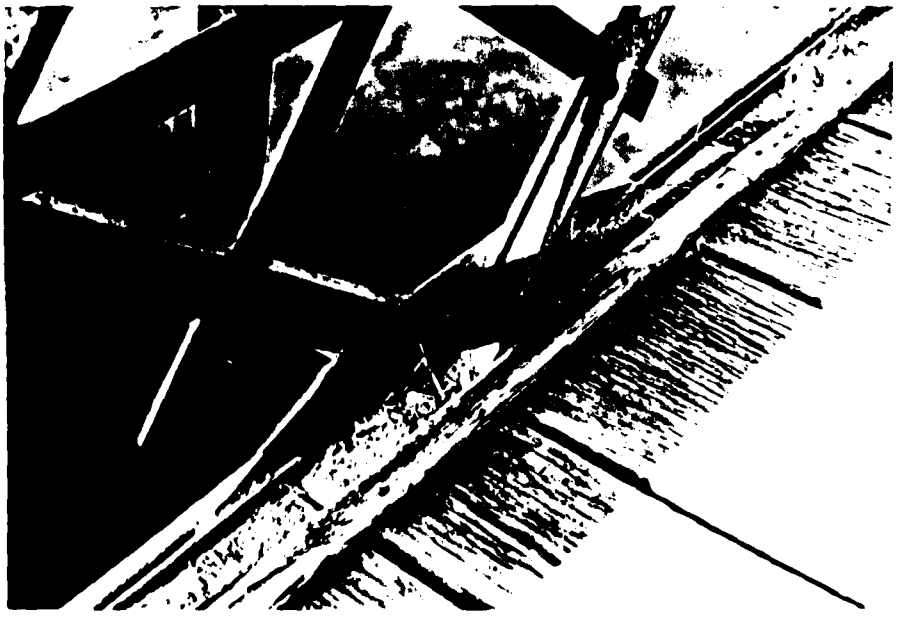
April 22, 1981

View of exposed bedrock contact at right spillway abutment.



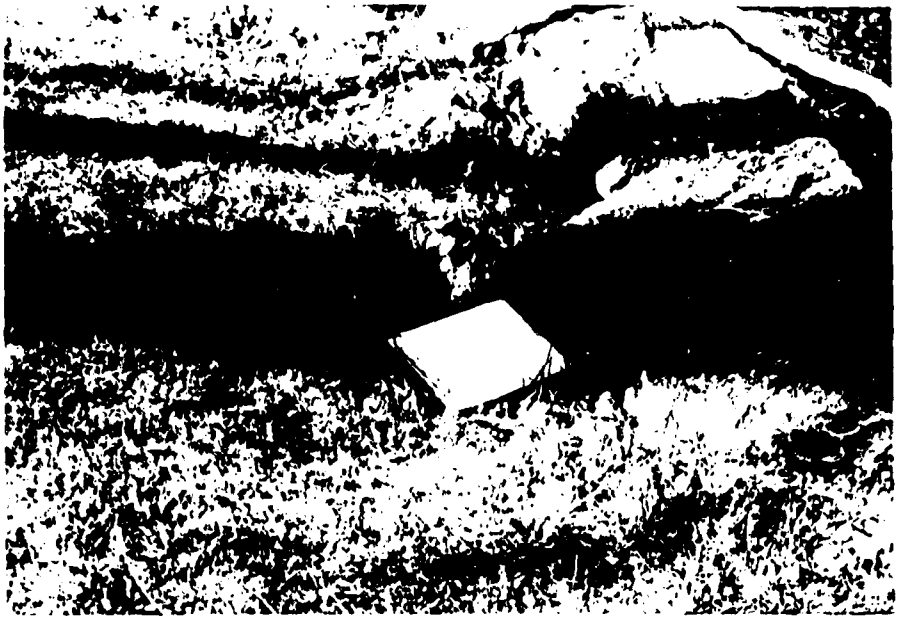
April 22, 19[illegible]

Gusset plates rusted through on bridge over spillway.



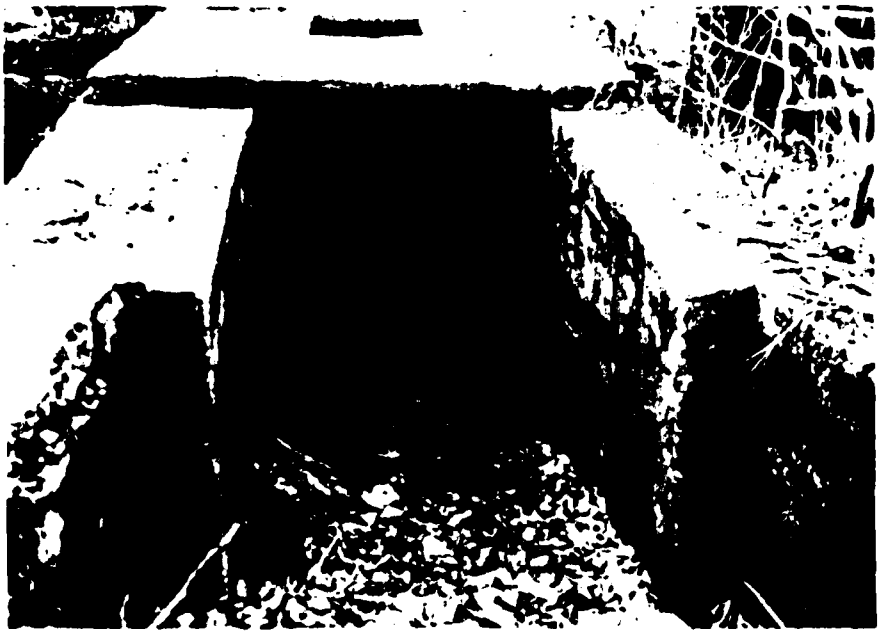
April 22, 198[illegible]

Rust eaten gussets on upstream truss; note that rust is eating into truss angle bars.



View of erosion to right downstream channel wall near spillway, rule could be extended 2 feet into opening.

Erosion typical of many locations along lined downstream channel at top of bank.



February 18, 1981

View of intake at head of old mill race at mill building on Main Street 200 feet downstream of dam.

April 22, 1981

View looking upstream across reservoir at inlet from Blair Creek; note that flow must turn nearly a right angle to pass over spillway.

April 22, 1981

View looking at downstream channel from right bank at dam; note Main Street Bridge.

April 22, 1981

View looking downstream from downstream side of Main Street Bridge.

APPENDIX 3

HYDROLOGIC COMPUTATIONS

BLAIR LAKE DAM

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

BLAIR LAKE DAM
BLAIRSTOWN TOWNSHIP, NEW JERSEY

REGIONAL VICINITY MAP

JUNE 1981

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

Anderson-Nichols & Company, Inc. BOSTON, MA.

SCALE IN MILES

0 1/2 1

MAP BASED ON U.S.G.S. 7.5 MINUTE QUADRANGLE SHEETS. BLAIRSTOWN, N.J. 1954, REVISED 1971, AND FLATBROOKVILLE, N.J., PA. 1954, REVISED 1971.

SQUARES 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
1/4 IN. SCALE

INFLOW HYDROGRAPH

The inflow hydrograph for Blair Lake will be routed outflow from Bass' Lake + Local inflow downstream of Bass Lake by SCS method.

Bass Lake has already been run using these data:

DA = 5.959 mi.
Lag = 3.3 hr.
precip = 22.2 inches
Use 112%, 123%, 133%, 142% for ratio of 6, 12, 24, and 48-hour storms to [illegible]
Loss data: initial loss = 1.00 inches; loss rate of 0.15 in/hr
200 30-minute time steps
Starting el. = 100.1

Stage	Discharge (cfs)	Storage
100.1	0	0
101.1	63	15.2
102.1	355	32.6 *
103.1	796	49.9 *
104.1	1511	67.3 *
105.1	2422	84.6 *
106.1	3,609	102 *
107.1	5,137	119 *
108.1	6,921	137 *
109.1	8,777	154

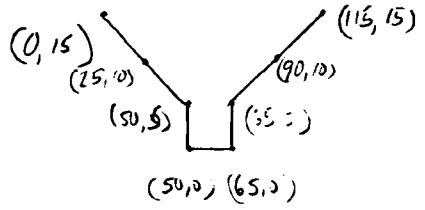
* - Linear interpolation

3 reaches from Bass Lake to Blair Lake.

Reach 1 = 1630 feet Slope = $\frac{183}{1630} = 0.11$

SQUARES 1/4 IN. SCALE

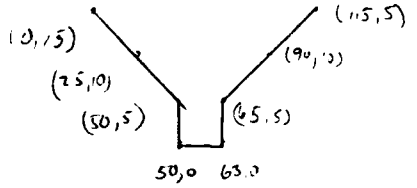
Typical cross section.



n: 0.05 channel
0.10 overbanks

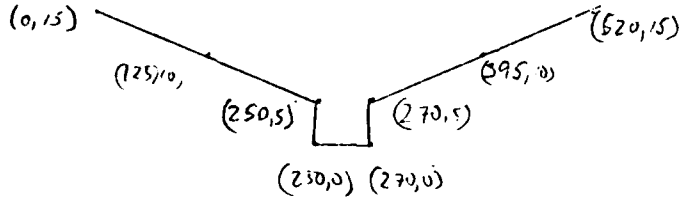
Reach 2 = 6,000 feet. Slope = $\frac{140}{6,000}$ = 0.023

typical cross section:



n=0.05 channel
=0.10 overbanks

Reach 3 = 10,800 feet, Slope = $\frac{85}{10,800}$ = 0.008



n: 0.05 channel
=0.10 Overbanks

Local inflow to Blair Lake

Area = 5.0 mi^2
Use loss and storm characteristics same as Bass Lake

SQUARES 1/4 IN. SCALE

Time of Concentration

① Texas Highway Method

Overland: length = 3,600 feet
slope = $\frac{400}{3600}$ = 0.111 = 11.1%
for woods, velocity = 3 fps

Time = $\frac{3600}{3}$ = 1,200 sec = 0.33 hours

Channel - Through tributary reach + reaches 2 and 3
Trib. reach - length = 8,000 ft, slope = 2.0% → V = 1 fps → $\frac{8,000}{1}$ sec = 2.22 hrs
Reach 2 - length = 6,000 ft., slope = 2.3%, V = 1 fps
→ time = 6,000 sec = 1.67 hr.
Reach 3 - length = 10,800 ft, slope = 0.8%, V = 1 fps
→ time = 10,800 sec = 3 hours

Total T_c = 3 + 1.67 + 2.22 + 0.33 = 7.22 hrs.

② Soil and Water Conservation

$$L = 0.6\,T_c = \frac{l^{0.8}(S+1)^{1.67}}{7700\,y^{0.5}}$$

$$\rightarrow T_c = \frac{l^{0.8}(S+1)^{.67}}{(0.6)(7700)(y^{0.5})}$$

l = 10,800 + 6,000 + 8,000 + 3,600 = 28,400
y = slope = $\frac{7100-355}{28,400}$ = 0.026 = 2.6%
C.N. = 70 for good grass on woods & Soil group C
S = $\frac{1,000}{70} - 10$ = 4.29

$$T_c = \frac{28,400^{0.8}(5.29)^{1.67}}{0.6(7700)(2.6)^{0.5}} = 6.79 \text{ hrs.}$$

③ Weston, or SCS T.R. #55

Overland: slope = 11.1%, → V = 0.85 fps (from TR 55 graph). Length 3,600 ft
Time = $\frac{3600}{0.85}$ = 4235 sec = 1.18 hrs.

channel: Tributary reach – ½ ft deep in 10 foot channel. Use Manning's formula, n = 0.05, R = $\frac{5}{11}$ = 0.45

$V = \frac{1.49}{0.05}(0.45)^{2/3}(0.02)^{\frac{1}{2}} = 2.5 fps$

Time = $\frac{8,000}{2.5}$ = 3,200 sec = 0.89 hrs.

Reach 2 – 1 ft in 15 foot channel, n = 0.05, R = $\frac{15}{17}$ = 0.88

$V = \frac{1.49}{0.05}(0.88)^{2/3}(0.023)^{\frac{1}{2}} = 4.2 fps$

Time = $\frac{6,000}{4.2}$ - 1429 sec = 0.40 hrs

Reach 3 – 1 ft. in a 20 ft. channel. n = 0.05, R = $\frac{20}{22}$ = 0.91

$V = \frac{1.49}{0.05}(0.91)^{2/3}(0.008)^{\frac{1}{2}} = 2.5 fps$

Time = $\frac{10,800}{2.5}$ = 4,320 sec = 1.20 hrs.

Total time = 1.2 + 0.4 + 0.89 + 1.18 = 3.67 hrs.

④ Kirby

Overland $T_c = 0.83\left(\frac{N\,l}{\sqrt{S}}\right)^{0.467}$ N = 0.7, l = 3,600, s = 0.111

$T_c = .83\left(\frac{.70 \cdot 3600}{\sqrt{0.111}}\right)^{0.467}$ = 53.8 min = 0.90 hrs

channel: See Manning's work for SCS T.R. 55 method

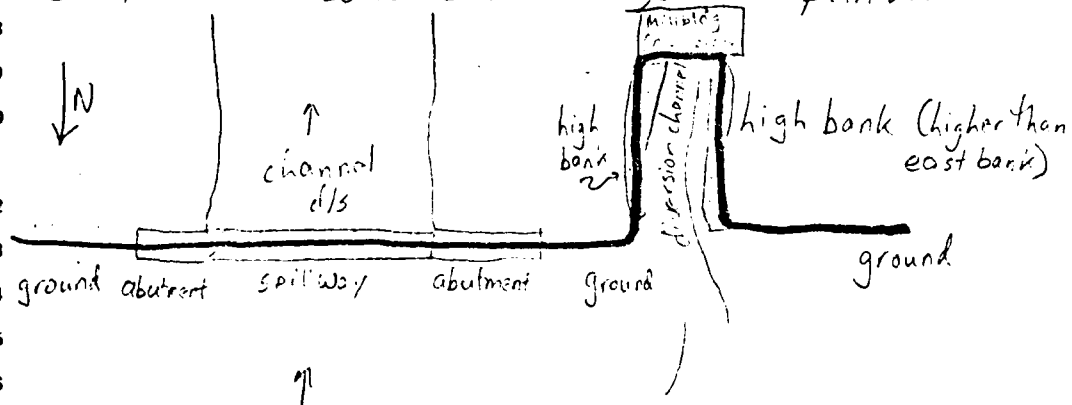
Total = 0.90 + 0.89 + 0.40 + 1.2 = 3.39 hrs.

Avg. T_c = (7.22 + 6.78 + 3.67 + 3.39) ¼ = 5.27 hrs. Log = 0.6 × 5.27 = 3.16

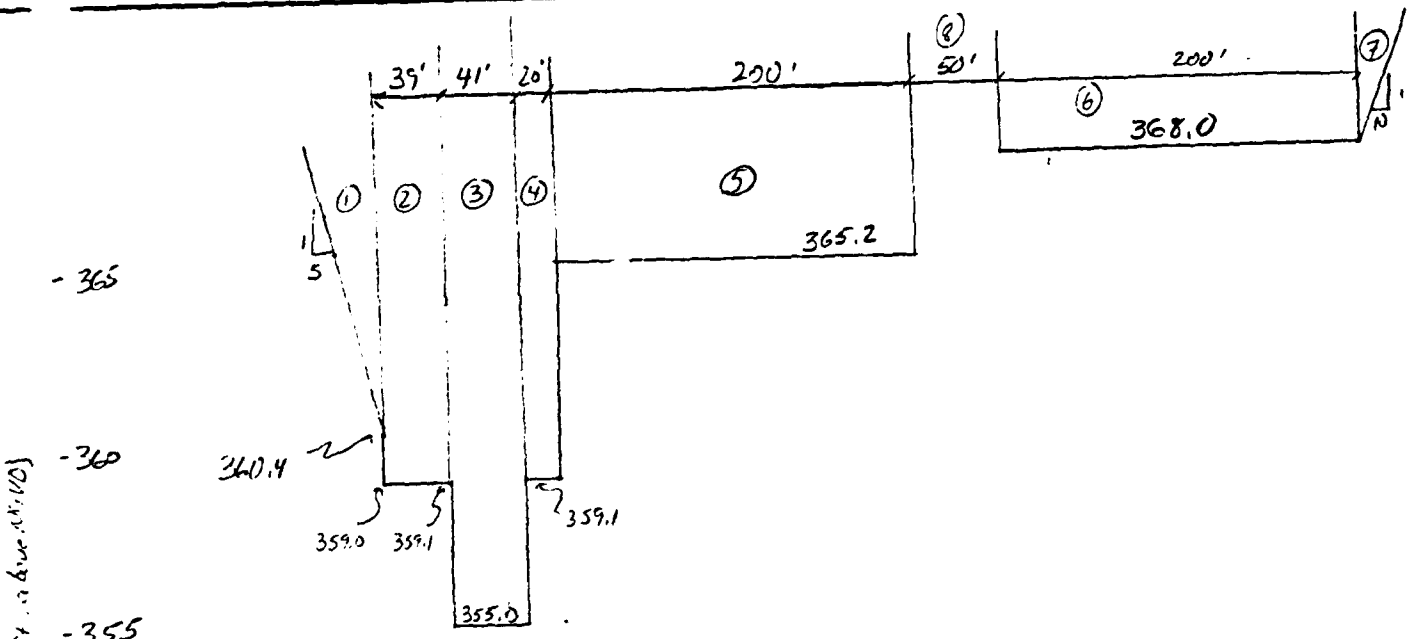
SQUARES /4 IN. SCALE

Stage-Discharge Curve

The hydraulic profile of Blair Dam is shown on page 6. The diversion channel to the right of the spillway is blocked by a closed (and apparently inoperable) gate at the mill building and high channel banks. If the water rises above 365.2, it will begin to flow over the east bank of the diversion channel into Blair Creek downstream of the dam. This serves as an earth weir about 300 feet long. In plan view:



control extends as the black line, which is the line shown as the hydraulic profile



① left side Slope
② top of dam - left abutment
③ spillway
④ top of dam - right abutment
⑤ diversion channel - east bank
⑥ diversion channel - west bank
⑦ right side slope
⑧ Mill building

} crest length of dam = 100 ft.

ANDERSON-NICHOLS

VERNON BOSTON CONCORD

HYDRAULIC PROFILE - BLAIR LAKE DAM

DATE	SCALE:	JOB NO.	SHEET NO.
6/19/81	1" = 100' H 1" = 5' V	3673-09	- 6 of 13

Anderson-Nichols & Company, Inc.

Subject: Blair Lake

Sheet No. 7 of 13
Date: 6/12/81
Computed: [illegible]
Checked: SLP

JOB NO.

SQUARES 1/4 IN. SCALE

Stage vs. Discharge

See profile on p6. We will assume the spillway bridge has negligible effect [illegible] discharge.

Spillway : section ③ $Q = 3.0 L_3 H_3^{3/2}$
$= 3.0(41)(E - 355.0)^{3/2}$

Top of Dam : [sections ② and ④] $Q = 2.8 L_2 H_2^{3/2} + 2.8 L_4 H_4^{3/2}$
$= 2.8(39)(E - 359.05)^{3/2} + 2.8(20)(E - 359.1)^{3/2}$

Assume Avg. El. of section ② : $\frac{359.1 + 359}{2} = 359.05$

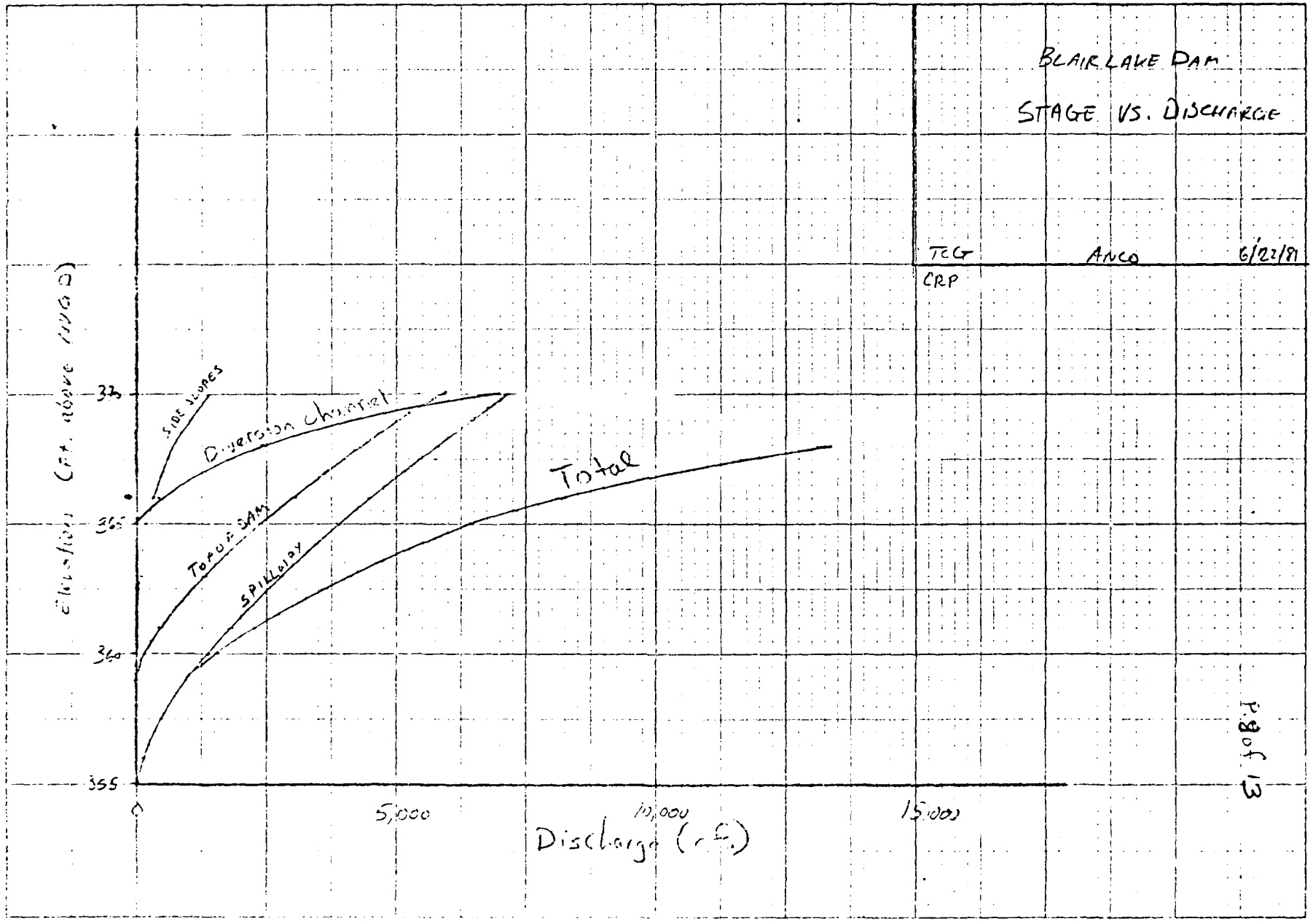
Old Diversion channel : [sections ⑤ and ⑥] $Q = 2.6 L_5 H_5^{3/2} + 2.6 L_6 H_6^{3/2}$
$= 2.6(200)(E - 365.2)^{3/2} + 2.6(200)(E - 36[illegible]$

Side Slopes [sections ① and ⑦] $Q = 2.6 L_1 H_1^{3/2} + 2.6 L_7 H_7^{3/2}$
$= 2.6\,(5(E - 360.4))[(0.5)(E - 360.4)]^{3/2}$
$+ 2.6\,(10(E - 368))[(0.5)(E$ [illegible]

ELEVATION (Ft. above NGVD)	DESCRIPTION	HEAD ABOVE SPILLWAY CREST (ft)	Q spillway (CFS)	Q top of dam (CFS)	Q Div Chan (CFS)	Q side slopes (CFS)	Q TOTAL (CFS)
355	spillway crest	0	0	0	0	0	0
356	–	1	123	0	0	0	123
357	–	2	348	0	0	0	348
358	–	3	639	0	0	0	[illegible]
359	top of dam	4	984	0	0	0	[illegible]
360	–	5	1,375	149	0	0	1,524
361	–	6	1,808	444	0	1	2,253
363	–	8	2,783	1,289	0	50	4,122
365	–	10	3,890	2,387	0	209	6,486
365.2	diversion channel west bank	10.2	4,007	2,509	0	232	6,748
366	–	11	4,487	3,016	372	341	8,216
368	diversion channel east bank	13	5,765	4,411	2,437	732	13,345
370	–	15	7,146	5,972	6,939	1,364	21,421

BLAIR LAKE DAM
STAGE VS. DISCHARGE

TCG ANCO 6/22/81
CRP



Anderson-Nichols & Company, Inc.

Subject Blair Lake

Sheet No. 9 of 13
Date 2/22/91
Computed [illegible]
Checked CKP

JOB NO.

Stage Vs. Storage

Area at pond surface = 4.3 acres (at 355' msl)
" " elev. 360 = 14.3
" " elev. 380 = 31.6

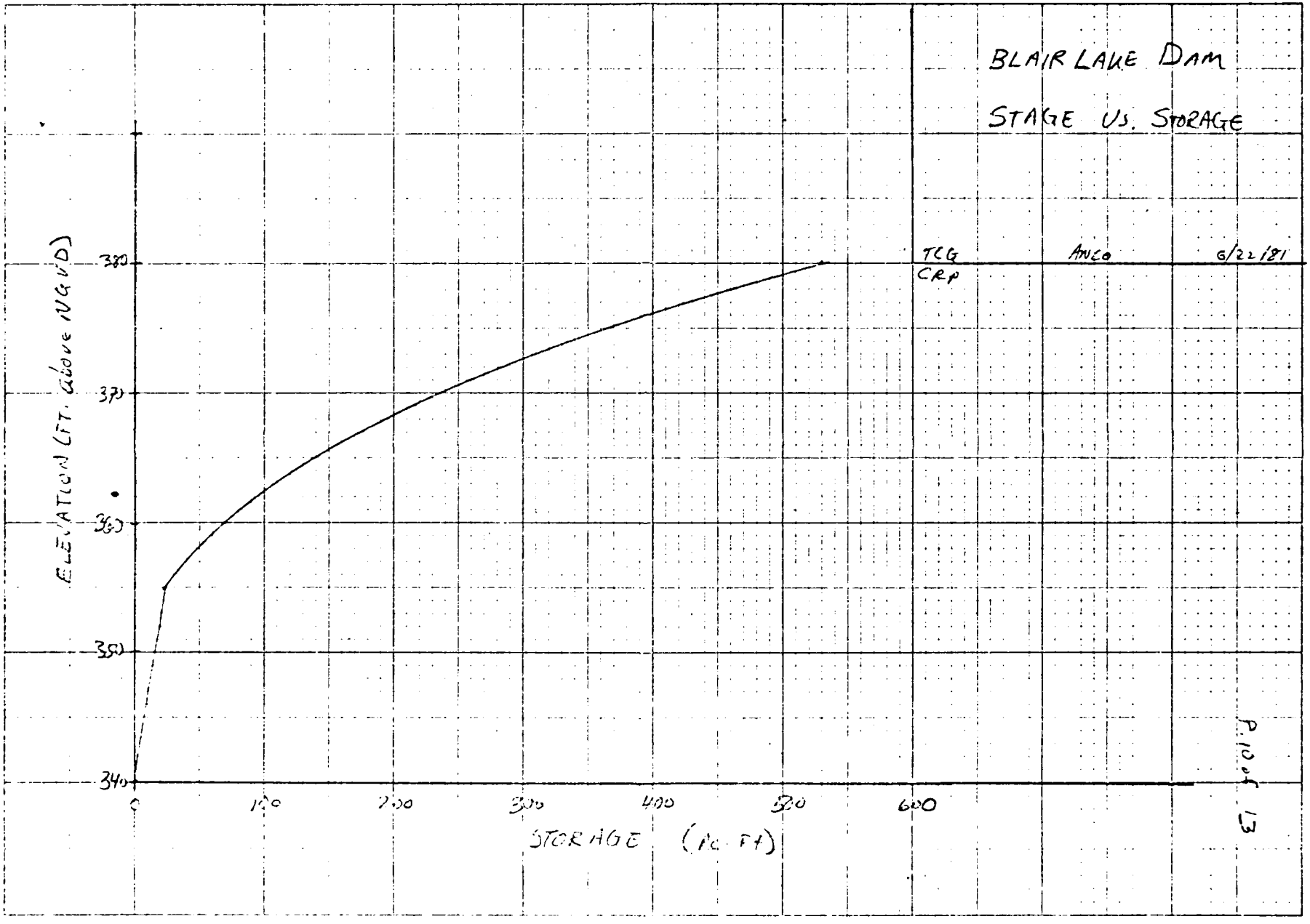
} estimated from USGS Quad

Storage = 0 at 340.7, bottom of reservoir

Storage = 24 acre-feet at spillway crest

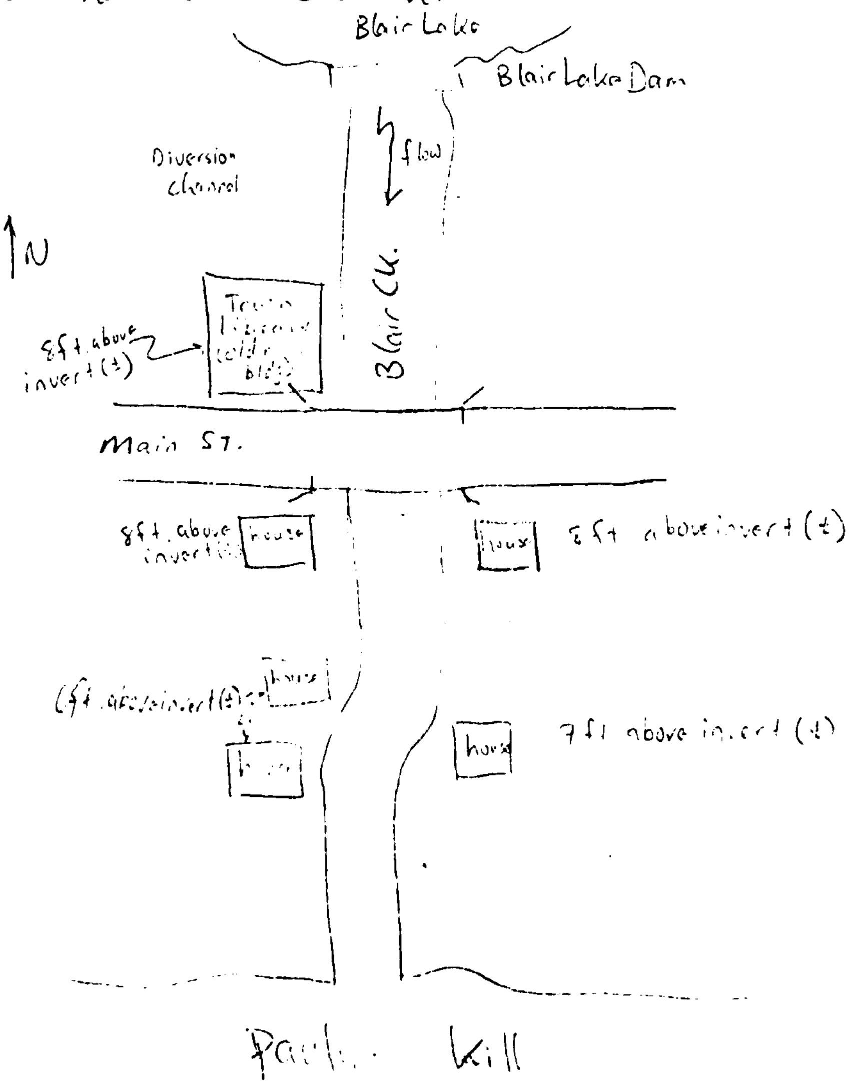
Elevation (Ft. above NGVD)	Surface Area (Acres)	Average S.A. (Acres)	Incremental Storage (Acre-foot)	Cumulative Storage (Acre-feet)
355	4.3			24
		9.3	46.5	
360	14.3			70.5
		22.95	459	
380	31.6			529.5

Stage vs. Storage plotted on p. 10

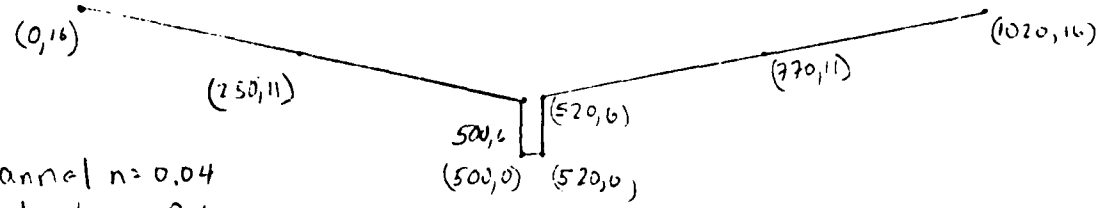


Downstream Analysis

Downstream of Blair Lake Dam, Blair Creek runs 240 feet through Blairstown to the Pauline Kill. The creek is crossed by Main Street bridge about 300 feet below the bridge. There are two houses and the Town Library at the bridge, about 8 feet above the stream invert. Downstream of Main Street, there are 3-4 houses about 6-8 feet above the invert. Sketch:



The cross section in this reach:



channel n = 0.04
overbank n = 0.10
slope = 0.011
length: 840'

SERIOUSLY INADEQUATE SPILLWAY

1. Dam is high hazard

2. A stage one foot over the dam crest would probably cause failure of the 39-foot long, left, earth abutment and/or the masonry spillway. Assume a 30 foot wide (bottom width) failure gap with 0.35:1 H:V side slopes, and a 1/2 hour time to develop breach.

- Flow before failure at damage stage = 161 cfs
- Stage " " " " " = 7.1 ft
- Peak flow after " " " " = 4,357 cfs
- Peak stage " " " " " = 9.8 ft

Increase of 2.7 feet in 25 minutes would cause a significant increase to the hazard of loss of life.

3. 1/2 PMF overtops the dam by 7.6 feet, and would cause failure.

The spillway is seriously inadequate.

Anderson-Nichols & Company, Inc.

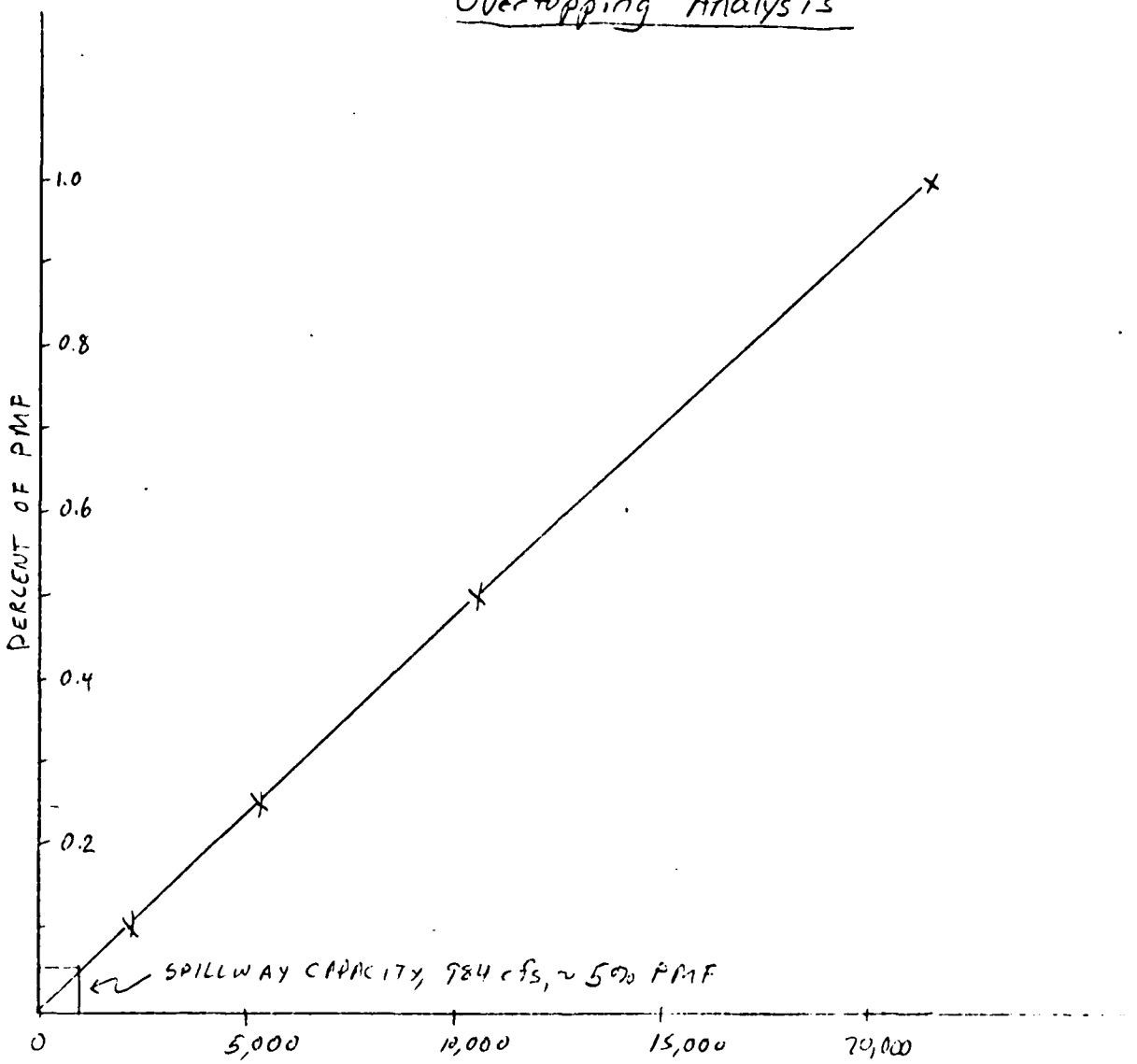
Subject Blair Lake

Sheet No. 13 of 13
Date 6/24/81
Computed TCG
Checked CPD

JOB NO.

QUARES /4 IN. SCALE

Overtopping Analysis



Discharge (cfs)

APPENDIX 4

HEC-1 OUTPUT

BLAIR LAKE DAM

```
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
ID     BLAIR LAKE DAM     OVERTOPPING ANALYSIS     TOM GOOCH     ANCO
ID     NEW JERSEY DAM NO. 774 - WARREN COUNTY - BLAIRSTOWN TOWNSHIP
ID     0.1,0.25,0.5,1.0 MULTIPLES OF PMF FROM 24-HOUR PMP
IT       30               0       200
IO        3
JR     FLOW      1.0      0.5     0.25      0.1

KK        A1  BASS LAKE INFLOW HYDROGRAPH - INPUT TAKEN FROM BASS LAKE REPORT
KM        INFLOW FROM SCS UNIT GRAPH COMPUTATIONS
KO        3
BA     5.90        0
PF     11.8      0.0        1
PM     22.2                          NO      112      123      133      142
LU        1     0.15
UD      3.3

KK        A2  ROUTE INFLOW HYDROGRAPH THROUGH BASS LAKE - INPUT FROM BASS LK REP
KO        3
RS        1     ELEV    100.1
SV        0     15.2     32.6     49.9     67.3     84.6     102.     119.     137.     154.
SE    100.1    101.1    102.1    103.1    104.1    105.1    106.1    107.1    108.1    109.1
SQ       0.      63.     355.     796.    1511.    2422.    3639.    5137.    6921.    8777.
SE    100.1    101.1    102.1    103.1    104.1    105.1    106.1    107.1    108.1    109.1

KK        A3  ROUTE OUTFLOW HYDROGRAPH FROM BASS LAKE THROUGH REACH 1
KO        3
RS        1     STOR       -1
RC      0.1     0.05      0.1    1630.     0.11
RX       0.      25.     49.9      50.      65.     65.1      90.     115.
RY      15.      10.       5.       0.       0.       5.      10.      15.

KK        A4  ROUTE HYDROGRAPH THROUGH REACH 2
KO        3
RS        1     STOR       -1
RC      0.1     0.05      0.1    6000.    0.023
RX       0.      25.     49.9      50.      65.     65.1      90.     115.
RY      15.      10.       5.       0.       0.       5.      10.      15.

KK        A5  ROUTE HYDROGRAPH THROUGH REACH 3
KO        3
RS        1     STOR       -1
RC      0.1     0.05      0.1   10800.    0.008
RX       0.     125.    249.9     250.     270.    270.1     395.     520.
RY      15.      10.       5.       0.       0.       5.      10.      15.

KK        A6  DEVELOP LOCAL INFLOW HYDROGRAPH - BASS LAKE TO BLAIR LAKE
BA      5.0
BF      15.      15.        1
PM     22.2                          NO      112      123      133      142
LU        1     0.15
UD     3.16
```

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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   46     KK       A7  COMBINE HYDROGRAPHS TO GET TOTAL INFLOW TO BLAIR LAKE
   47     HC        2
   48     KK       A8  ROUTE INFLOW HYDROGRAPH THROUGH BLAIR LAKE
   49     RS        1    STOR      24.
   50     SQ       0.       0.     123.     348.     904.    2253.    4122.    6748.   13345.   21421.
   51     SE    340.7     355.     356.     357.     359.     361.     363.    365.2     368.     370.
   52     SV       0.       24.      30.      40.      60.      80.     109.     142.     193.     235.
   53     SE    340.7     355.     356.     357.     359.     361.     363.    365.2     368.     370.
   54     SS     355.      41.      3.0      1.5
   55     ST     359.      59.      0.0      1.5
   56     ZZ
```

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**************************************          **************************************
*                                    *          *                                    *
*   FLOOD HYDROGRAPH PACKAGE (HEC-1) *          *   U.S. ARMY CORPS OF ENGINEERS     *
*           FEBRUARY 1981            *          * THE HYDROLOGIC ENGINEERING CENTER  *
*                                    *          *        609 SECOND STREET           *
*                                    *          *     DAVIS, CALIFORNIA 95616        *
*  RUN DATE08/12/81   TIME15.55.07   *          * (916) 440-3285 OR (FTS) 448-3285   *
*                                    *          *                                    *
**************************************          **************************************

                    BLAIR LAKE DAM    OVERTOPPING ANALYSIS  -  TOM GOOCH    ANCO
                    NEW JERSEY DAM NO. 774 - WARREN COUNTY - BLAIRSTOWN TOWNSHIP
                    0.1,0.25,0.5,1.0 MULTIPLES OF PMF FROM 24-HOUR PMP

  5 IO      OUTPUT CONTROL VARIABLES
               IPRNT          3   PRINT CONTROL
               IPLOT          0   PLOT CONTROL
               QSCAL         0.   HYDROGRAPH PLOT SCALE
               DMSG         YES   PRINT DIAGNOSTIC MESSAGES

    IT      HYDROGRAPH TIME DATA
               NMIN          30   MINUTES IN COMPUTATION INTERVAL
               IDATE      1   0   STARTING DATE
               ITIME       0000   STARTING TIME
               NQ           200   NUMBER OF HYDROGRAPH ORDINATES
               NDDATE     5   0   ENDING DATE
               NDTIME      0330   ENDING TIME

             COMPUTATION INTERVAL    0.50 HOURS
                  TOTAL TIME BASE   99.50 HOURS

        ENGLISH UNITS
            DRAINAGE AREA          SQUARE MILES
            PRECIPITATION DEPTH    INCHES
            LENGTH, ELEVATION      FEET
            FLOW                   CUBIC FEET PER SECOND
            STORAGE VOLUME         ACRE-FEET
            SURFACE AREA           ACRES
            TEMPERATURE            DEGREES FAHRENHEIT

    JP      MULTI-PLAN OPTION
               NPLAN          1   NUMBER OF PLANS

    JR      MULTI-RATIO OPTION
              RATIOS OF RUNOFF
            1.00      0.50      0.25      0.10

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
          *            *
  7 KK    *     A1     *        BASS LAKE INFLOW HYDROGRAPH - INPUT TAKEN FROM BASS LAKE REPORT
          *            *
          **************
                          INFLOW FROM SCS UNIT GRAPH COMPUTATIONS

  9 KO      OUTPUT CONTROL VARIABLES
               IPRNT          3   PRINT CONTROL
               IPLOT          0   PLOT CONTROL
               QSCAL         0.   HYDROGRAPH PLOT SCALE

          SUBBASIN RUNOFF DATA

 10 BA      SUBBASIN CHARACTERISTICS
               TAREA       5.90   SUBBASIN AREA

 11 BF      BASE FLOW CHARACTERISTICS
               STRTQ      11.80   INITIAL FLOW
               QRCSN        0.0   BEGIN BASE FLOW RECESSION
               RTIOR    1.00000   RECESSION CONSTANT
```

PRECIPITATION DATA

12 PM PROBABLE MAXIMUM STORM

PMS	22.20	INDEX PRECIPITATION
TRSPC	0.80	TRANSPOSITION COEFFICIENT
TRSDA	5.90	TRANSPOSITION AREA
SWD	NO	USE SWD DISTRIBUTION

PERCENT OF INDEX PRECIPITATION OCCURRING IN GIVEN TIME

6-HR	12-HR	24-HR	48-HR	72-HR	96-HR
112.0	123.0	133.0	142.0	0.0	0.0

13 LU UNIFORM LOSS RATE

STRTL	1.00	INITIAL LOSS
CNSTL	0.15	UNIFORM LOSS RATE
RTIMP	0.0	PERCENT IMPERVIOUS AREA

14 UD SCS DIMENSIONLESS UNITGRAPH

TLAG	3.30 LAG

***

UNIT HYDROGRAPH
35 END-OF-PERIOD ORDINATES

47.	139.	278.	474.	662.	768.	802.	782.	709.	619.
498.	377.	298.	236.	192.	153.	119.	96.	77.	60.
48.	38.	30.	24.	19.	15.	12.	10.	8.	7.
5.	4.	3.	2.	1.					

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
12000.	43.00	(CFS)	9250.	3211.	1090.	792.
		(INCHES)	14.577	20.242	20.611	20.696
		(AC-FT)	4587.	6369.	6486.	6512.

CUMULATIVE AREA = 5.90 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION A1
FOR PLAN 1, RATIO = 1.00

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
12000.	43.00	(CFS)	9250.	3211.	1090.	792.
		(INCHES)	14.577	20.242	20.611	20.696
		(AC-FT)	4587.	6369.	6486.	6512.

CUMULATIVE AREA = 5.90 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION A1
FOR PLAN 1, RATIO = 0.50

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
6000.	43.00	(CFS)	4625.	1606.	545.	396.
		(INCHES)	7.289	10.121	10.305	10.348
		(AC-FT)	2293.	3185.	3243.	3256.

CUMULATIVE AREA = 5.90 SQ MI

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***            ***            ***            ***            ***

                  HYDROGRAPH AT STATION         A1
                    FOR PLAN 1, RATIO = 0.25

PEAK FLOW      TIME                               MAXIMUM AVERAGE FLOW
  (CFS)        (HR)                       6-HR        24-HR        72-HR       99.50-HR
  3000.       43.00          (CFS)        2313.        803.         272.         198.
                           (INCHES)       3.644       5.061        5.153        5.174
                           (AC-FT)        1147.       1592.        1621.        1628.

                  CUMULATIVE AREA =     5.90 SQ MI

***            ***            ***            ***            ***

                  HYDROGRAPH AT STATION         A1
                    FOR PLAN 1, RATIO = 0.10

PEAK FLOW      TIME                               MAXIMUM AVERAGE FLOW
  (CFS)        (HR)                       6-HR        24-HR        72-HR       99.50-HR
  1200.       43.00          (CFS)         925.        321.         109.          79.
                           (INCHES)       1.450       2.024        2.061        2.070
                           (AC-FT)         459.        637.         649.         651.

                  CUMULATIVE AREA =     5.90 SQ MI

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
          *            *
 15 KK    *     A2     *        ROUTE INFLOW HYDROGRAPH THROUGH BASS LAKE - INPUT FROM BASS LK REP
          *            *
          **************

 16 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           3  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

             HYDROGRAPH ROUTING DATA

 17 RS         STORAGE ROUTING
                    NSTPS           1  NUMBER OF SUBREACHES
                    ITYP         ELEV  TYPE OF INITIAL CONDITION
                    RSVRIC     100.10  INITIAL CONDITION
                    X             0.0  WORKING R AND D COEFFICIENT

 18 SV          STORAGE      0.0     15.2     32.6     49.9     67.3     84.6    102.0    119.0    137.0    154.0

 19 SE        ELEVATION   100.10   101.10   102.10   103.10   104.10   105.10   106.10   107.10   108.10   109.10

 20 SQ        DISCHARGE       0.      63.     355.     796.    1511.    2422.    3639.    5137.    6921.    8777.

 21 SE        ELEVATION   100.10   101.10   102.10   103.10   104.10   105.10   106.10   107.10   108.10   109.10

                                                ***

                                  COMPUTED STORAGE-OUTFLOW CURVE
          STORAGE      0.0     15.20    32.60    49.90    67.30    84.60   102.00   119.00   137.00   154.00

          OUTFLOW      0.0     63.00   355.00   796.00  1511.00  2422.00  3639.00  5137.00  6921.00  8777.00
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*** WARNING *** MODIFIED PULS ROUTING WILL BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 1511. TO 8777.
USE SHORTER TIME INTERVAL OR LONGER REACH LENGTH

*** *** *** *** ***

HYDROGRAPH AT STATION A2
FOR PLAN 1. RATIO = 1.00

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	99.50-HR
11982.	43.00	(CFS)	9224.	3206.	1090.	792.
		(INCHES)	14.536	20.219	20.611	20.687
		(AC-FT)	4574.	6362.	6486.	6509.

PEAK STORAGE (AC-FT)	TIME (HR)		MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	99.50-HR
183.	43.00		158.	78.	30.	23.

PEAK STAGE (FEET)	TIME (HR)		MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	99.50-HR
110.83	43.00		109.33	104.70	101.92	101.47

CUMULATIVE AREA = 5.90 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION A2
FOR PLAN 1. RATIO = 0.50

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	99.50-HR
5987.	43.00	(CFS)	4613.	1602.	545.	396.
		(INCHES)	7.270	10.097	10.311	10.353
		(AC-FT)	2287.	3177.	3244.	3258.

PEAK STORAGE (AC-FT)	TIME (HR)		MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	99.50-HR
128.	43.00		112.	55.	21.	16.

PEAK STAGE (FEET)	TIME (HR)		MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	99.50-HR
107.58	43.00		106.70	103.40	101.38	101.05

CUMULATIVE AREA = 5.90 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION A2
FOR PLAN 1. RATIO = 0.25

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	99.50-HR
2987.	43.00	(CFS)	2305.	800.	273.	198.
		(INCHES)	3.632	5.042	5.155	5.177
		(AC-FT)	1143.	1586.	1622.	1629.

PEAK STORAGE (AC-FT)	TIME (HR)		MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	99.50-HR
93.	43.00		81.	40.	15.	11.

PEAK STAGE (FEET)	TIME (HR)		MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	99.50-HR
105.56	43.00		104.91	102.49	100.99	100.76

CUMULATIVE AREA = 5.90 SQ MI

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  ***               ***               ***               ***               ***

                    HYDROGRAPH AT STATION        A2
                      FOR PLAN 1. RATIO = 0.10

PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
  (CFS)       (HR)                       6-HR        24-HR        72-HR        99.50-HR
  1185.      43.50            (CFS)      915.         319.         109.            79.
                            (INCHES)    1.442        2.013        2.063          7.071
                             (AC-FT)     454.         633.         649.           652.

PEAK STORAGE  TIME                              MAXIMUM AVERAGE STORAGE
 (AC-FT)      (HR)                       6-HR        24-HR        72-HR        99.50-HR
     59.     43.50                        52.          25.           9.             7.

PEAK STAGE    TIME                              MAXIMUM AVERAGE STAGE
 (FEET)       (HR)                       6-HR        24-HR        72-HR        99.50-HR
 103.64      43.50                     103.22       101.62       100.65         100.50

                    CUMULATIVE AREA =     5.90 SQ MI

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
 22 KK        *      A3    *        ROUTE OUTFLOW HYDROGRAPH FROM BASS LAKE THROUGH REACH 1
              *            *
              **************

 23 KO            OUTPUT CONTROL VARIABLES
                        IPRNT          3  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE

                HYDROGRAPH ROUTING DATA

 24 RS            STORAGE ROUTING
                        NSTPS          1  NUMBER OF SUBREACHES
                         ITYP       STOR  TYPE OF INITIAL CONDITION
                       RSVRIC      -1.00  INITIAL CONDITION
                            X        0.0  WORKING R AND D COEFFICIENT

 25 RC            NORMAL DEPTH CHANNEL ROUTING
                          ANL      0.100  LEFT OVERBANK N-VALUE
                         ANCH      0.050  MAIN CHANNEL N-VALUE
                          ANR      0.100  RIGHT OVERBANK N-VALUE
                        RLNTH      1630.  REACH LENGTH
                          SEL     0.1100  ENERGY SLOPE
                        ELMAX        0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                          CROSS-SECTION DATA
                       --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 27 RY          ELEVATION   15.00      10.00      5.00       0.0        0.0       5.00      10.00     15.00
 26 RX          DISTANCE     0.0       25.00     49.90      50.00      65.00     65.10      90.00    115.00

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COMPUTED STORAGE-OUTFLOW CURVE

STORAGE	0.0	0.44	0.89	1.33	1.78	2.23	2.68	3.18	3.90	4.65
	6.03	7.45	9.10	10.98	13.10	15.44	18.02	20.84	23.89	27.17
OUTFLOW	0.0	93.69	280.42	522.29	802.82	1112.24	1444.16	1846.67	2338.21	2920.77
	3611.68	4426.11	5377.95	6479.98	7744.44	9183.40	10808.17	12629.64	14658.39	16904.67
ELEVATION	0.0	0.79	1.58	2.37	3.16	3.95	4.74	5.53	6.32	7.11
	7.89	8.68	9.47	10.26	11.05	11.84	12.63	13.42	14.21	15.00

*** WARNING *** MODIFIED PULS ROUTING WILL BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 0. TO 16905.
USE SHORTER TIME INTERVAL OR LONGER REACH LENGTH

*** *** *** *** ***

HYDROGRAPH AT STATION A3
FOR PLAN 1. RATIO = 1.00

PEAK FLOW (CFS)	TIME (HR)		6-HR	24-HR	72-HR	99.50-HR
11960.	43.00	MAXIMUM AVERAGE FLOW (CFS)	9226.	3206.	1090.	792.
		(INCHES)	14.542	20.219	20.611	20.687
		(AC-FT)	4576.	6362.	6486.	6509.
PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE	6-HR	24-HR	72-HR	99.50-HR
26.	43.00		15.	6.	2.	1.
PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE	6-HR	24-HR	72-HR	99.50-HR
15.14	43.00		11.74	5.55	2.02	1.49

CUMULATIVE AREA = 5.90 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION A3
FOR PLAN 1. RATIO = 0.50

PEAK FLOW (CFS)	TIME (HR)		6-HR	24-HR	72-HR	99.50-HR
5989.	43.00	MAXIMUM AVERAGE FLOW (CFS)	4615.	1602.	545.	396.
		(INCHES)	7.272	10.097	10.311	10.353
		(AC-FT)	2288.	3177.	3244.	3258.
PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE	6-HR	24-HR	72-HR	99.50-HR
10.	43.00		8.	3.	1.	1.
PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE	6-HR	24-HR	72-HR	99.50-HR
9.91	43.00		8.74	3.69	1.39	1.02

CUMULATIVE AREA = 5.90 SQ MI

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    ***              ***              ***              ***              ***

                    HYDROGRAPH AT STATION        A3
                     FOR PLAN 1, RATIO = 0.25

 PEAK FLOW      TIME                               MAXIMUM AVERAGE FLOW
   (CFS)        (HR)                     6-HR        24-HR        72-HR        99.50-HR
   2984.        43.00         (CFS)      2305.        800.         273.          198.
                            (INCHES)     3.632       5.042        5.155         5.177
                            (AC-FT)      1143.       1556.        1622.         1629.

 PEAK STORAGE   TIME                               MAXIMUM AVERAGE STORAGE
   (AC-FT)      (HR)                     6-HR        24-HR        72-HR        99.50-HR
      5.        43.00                      4.          2.           1.            0.

 PEAK STAGE     TIME                               MAXIMUM AVERAGE STAGE
   (FEET)       (HR)                     6-HR        24-HR        72-HR        99.50-HR
    7.18        43.00                    6.17        2.61         0.92          0.57

                    CUMULATIVE AREA =     5.90 SQ MI

    ***              ***              ***              ***              ***

                    HYDROGRAPH AT STATION        A3
                     FOR PLAN 1, RATIO = 0.10

 PEAK FLOW      TIME                               MAXIMUM AVERAGE FLOW
   (CFS)        (HR)                     6-HR        24-HR        72-HR        99.50-HR
   1186.        43.50         (CFS)       915.        319.         109.           79.
                            (INCHES)     1.442       2.013        2.063         2.071
                            (AC-FT)       454.        633.         649.          652.

 PEAK STORAGE   TIME                               MAXIMUM AVERAGE STORAGE
   (AC-FT)      (HR)                     6-HR        24-HR        72-HR        99.50-HR
      2.        43.50                      2.          1.           0.            0.

 PEAK STAGE     TIME                               MAXIMUM AVERAGE STAGE
   (FEET)       (HR)                     6-HR        24-HR        72-HR        99.50-HR
    4.12        43.50                    3.43        1.41         0.49          0.36

                    CUMULATIVE AREA =     5.90 SQ MI

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

             **************
             *            *
  26 KK      *     A4     *        ROUTE HYDROGRAPH THROUGH REACH 2
             *            *
             **************

  29 KO           OUTPUT CONTROL VARIABLES
                       IPRNT            3   PRINT CONTROL
                       IPLOT            0   PLOT CONTROL
                       QSCAL           0.   HYDROGRAPH PLOT SCALE

                HYDROGRAPH ROUTING DATA

  30 RS           STORAGE ROUTING
                       NSTPS            1   NUMBER OF SUBREACHES
                       ITYP          STOR   TYPE OF INITIAL CONDITION
                     RSVRIC         -1.00   INITIAL CONDITION
                          X           0.0   WORKING R AND D COEFFICIENT

  31 RC           NORMAL DEPTH CHANNEL ROUTING
                        ANL         0.100   LEFT OVERBANK N-VALUE
                       ANCH         0.050   MAIN CHANNEL N-VALUE
                        ANR         0.100   RIGHT OVERBANK N-VALUE
                      RLNTH         6000.   REACH LENGTH
                        SEL        0.0230   ENERGY SLOPE
                      ELMAX           0.0   MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION
```

CROSS-SECTION DATA

		--- LEFT OVERBANK ---			* ------- MAIN CHANNEL ------- *			--- RIGHT OVERBANK ---	
33 RY	ELEVATION	15.00	10.00	5.00	0.0	0.0	5.00	10.00	15.00
32 RX	DISTANCE	0.0	25.00	49.90	50.00	65.00	65.10	90.00	115.00

***

COMPUTED STORAGE-OUTFLOW CURVE

STORAGE	0.0	1.63	3.27	4.91	6.55	8.20	9.85	11.69	14.34	17.85
	22.21	27.42	33.49	40.42	48.20	56.85	66.35	76.71	87.92	100.00
OUTFLOW	0.0	42.84	128.23	238.83	367.10	508.59	660.36	844.42	1069.18	1335.56
	1651.49	2023.90	2459.15	2963.07	3541.26	4199.24	4942.19	5775.09	6702.76	7729.90
ELEVATION	0.0	0.79	1.58	2.37	3.16	3.95	4.74	5.53	6.32	7.11
	7.89	8.68	9.47	10.26	11.05	11.84	12.63	13.42	14.21	15.00

*** WARNING *** MODIFIED PULS ROUTING WILL BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 43. TO 7730.
USE SHORTER TIME INTERVAL OR LONGER REACH LENGTH

*** *** *** *** ***

HYDROGRAPH AT STATION A4
FOR PLAN 1, RATIO = 1.00

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
11910.	43.00	(CFS)	9236.	3206.	1090.	792.
		(INCHES)	14.557	20.218	20.611	20.685
		(AC-FT)	4581.	6362.	6486.	6509.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	99.50-HR
149.	43.00	118.	42.	15.	11.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	99.50-HR
16.21	43.00	16.14	8.07	3.03	2.24

CUMULATIVE AREA = 5.90 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION A4
FOR PLAN 1, RATIO = 0.50

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
5952.	43.00	(CFS)	4615.	1602.	545.	396.
		(INCHES)	7.272	10.096	10.310	10.352
		(AC-FT)	2288.	3177.	3244.	3258.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	99.50-HR
79.	43.00	62.	22.	8.	6.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	99.50-HR
13.57	43.00	12.18	5.80	2.14	1.58

CUMULATIVE AREA = 5.90 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION A4
FOR PLAN 1, RATIO = 0.25

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
2976.	43.50	(CFS)	2302.	800.	273.	198.
		(INCHES)	3.628	5.041	5.155	5.176
		(AC-FT)	1142.	1586.	1622.	1629.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	99.50-HR
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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PEAK STAGE     TIME                               MAXIMUM AVERAGE STAGE
  (FEET)       (HR)                       6-HR       24-HR        72-HR        99.50-HR
  13.57        43.00                     12.18        5.80         7.14            1.58

                        CUMULATIVE AREA =    5.90 SQ MI

     ***            ***            ***            ***            ***

                        HYDROGRAPH AT STATION        A4
                          FOR PLAN 1. RATIO = 0.25

PEAK FLOW      TIME                               MAXIMUM AVERAGE FLOW
  (CFS)        (HR)                       6-HR       24-HR        72-HR        99.50-HR
  2976.        43.50            (CFS)    2302.        800.         273.            198.
                              (INCHES)   3.628       5.041        5.155           5.176
                              (AC-FT)    1142.       1556.        1622.           1629.

PEAK STORAGE   TIME                               MAXIMUM AVERAGE STORAGE
  (AC-FT)      (HR)                       6-HR       24-HR        72-HR        99.50-HR
    41.        43.50                       31.         12.           4.              3.

PEAK STAGE     TIME                               MAXIMUM AVERAGE STAGE
  (FEET)       (HR)                       6-HR       24-HR        72-HR        99.50-HR
  10.28        43.50                      9.10        4.09         1.47            1.08

                        CUMULATIVE AREA =    5.90 SQ MI

     ***            ***            ***            ***            ***

                        HYDROGRAPH AT STATION        A4
                          FOR PLAN 1. RATIO = 0.10

PEAK FLOW      TIME                               MAXIMUM AVERAGE FLOW
  (CFS)        (HR)                       6-HR       24-HR        72-HR        99.50-HR
  1166.        43.50            (CFS)     913.        319.         109.             79.
                              (INCHES)   1.439       2.013        2.063           2.071
                              (AC-FT)     453.        633.         649.            652.

PEAK STORAGE   TIME                               MAXIMUM AVERAGE STORAGE
  (AC-FT)      (HR)                       6-HR       24-HR        72-HR        99.50-HR
    16.        43.50                       13.          5.           2.              1.

PEAK STAGE     TIME                               MAXIMUM AVERAGE STAGE
  (FEET)       (HR)                       6-HR       24-HR        72-HR        99.50-HR
   6.67        43.50                      5.66        2.42         0.85            0.62

                        CUMULATIVE AREA =    5.90 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              *************
              *           *
 34 KK        *     A5    *        ROUTE HYDROGRAPH THROUGH REACH 3
              *           *
              *************

 35 KO              OUTPUT CONTROL VARIABLES
                         IPRNT           3  PRINT CONTROL
                         IPLOT           0  PLOT CONTROL
                         QSCAL          0.  HYDROGRAPH PLOT SCALE

                HYDROGRAPH ROUTING DATA

 36 RS              STORAGE ROUTING
                         NSTPS           1  NUMBER OF SUBREACHES
                         ITYP         STOR  TYPE OF INITIAL CONDITION
                        RSVRIC       -1.00  INITIAL CONDITION
                             X         0.0  WORKING R AND D COEFFICIENT

 37 RC              NORMAL DEPTH CHANNEL ROUTING
                           ANL       0.100  LEFT OVERBANK N-VALUE
                          ANCH       0.050  MAIN CHANNEL N-VALUE
                           ANR       0.100  RIGHT OVERBANK N-VALUE
                         RLNTH      10000.  REACH LENGTH
                           SEL      0.0050  ENERGY SLOPE
                         ELMAX         0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION
```

CROSS-SECTION DATA

		--- LEFT OVERBANK ---			* ------ MAIN CHANNEL -------			* --- RIGHT OVERBANK ---		
39 RY	ELEVATION	15.00	10.00	5.00	0.0	0.0	5.00	10.00	15.00	
36 RX	DISTANCE	0.0	125.00	249.90	250.00	270.00	270.10	395.00	520.00	

***

COMPUTED STORAGE-OUTFLOW CURVE

STORAGE	0.0	3.92	7.84	11.77	15.71	19.65	23.60	29.27	42.23	62.91
	91.31	127.43	171.28	222.84	282.13	349.14	423.88	506.35	596.54	694.46
OUTFLOW	0.0	34.22	103.77	195.46	303.34	423.78	554.29	712.91	930.29	1232.43
	1644.62	2188.98	2885.67	3753.43	4809.95	6072.16	7556.25	9277.75	11251.71	13492.73
ELEVATION	0.0	0.79	1.58	2.37	3.16	3.95	4.74	5.53	6.32	7.11
	7.89	8.68	9.47	10.26	11.05	11.84	12.63	13.42	14.21	15.00

*** *** *** *** ***

HYDROGRAPH AT STATION A5
FOR PLAN 1, RATIO = 1.00

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	99.50-HR
11597.	44.00	(CFS)	9070.	3207.	1090.	791.
		(INCHES)	14.294	20.212	20.611	20.681
		(AC-FT)	4498.	6360.	6485.	6508.

PEAK STORAGE (AC-FT)	TIME (HR)		MAXIMUM AVERAGE STORAGE		
		6-HR	24-HR	72-HR	99.50-HR
612.	44.00	494.	176.	61.	44.

PEAK STAGE (FEET)	TIME (HR)		MAXIMUM AVERAGE STAGE		
		6-HR	24-HR	72-HR	99.50-HR
14.33	44.00	13.25	7.50	2.91	2.17

CUMULATIVE AREA = 5.90 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION A5
FOR PLAN 1, RATIO = 0.50

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	99.50-HR
5751.	44.00	(CFS)	4496.	1601.	545.	396.
		(INCHES)	7.085	10.092	10.309	10.350
		(AC-FT)	2229.	3176.	3244.	3257.

PEAK STORAGE (AC-FT)	TIME (HR)		MAXIMUM AVERAGE STORAGE		
		6-HR	24-HR	72-HR	99.50-HR
332.	44.00	263.	92.	32.	23.

PEAK STAGE (FEET)	TIME (HR)		MAXIMUM AVERAGE STAGE		
		6-HR	24-HR	72-HR	99.50-HR
11.64	44.00	10.75	5.71	2.16	1.60

CUMULATIVE AREA = 5.90 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION A5
FOR PLAN 1, RATIO = 0.25

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	99.50-HR
2034.	44.00	(CFS)	2240.	799.	273.	198.
		(INCHES)	3.530	5.037	5.155	5.175
		(AC-FT)	1111.	1585.	1622.	1628.

PEAK STORAGE (AC-FT)	TIME (HR)		MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	99.50-HR
165.	44.00		130.	45.	16.	11.

PEAK STAGE (FEET)	TIME (HR)		MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	99.50-HR
9.41	44.00		8.67	4.25	1.56	1.15

CUMULATIVE AREA = 5.90 SQ MI

HYDROGRAPH AT STATION A5
FOR PLAN 1, RATIO = 0.10

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	99.50-HR
1125.	44.00	(CFS)	905.	319.	109.	79.
		(INCHES)	1.426	2.010	2.062	2.071
		(AC-FT)	449.	632.	649.	652.

PEAK STORAGE (AC-FT)	TIME (HR)		MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	99.50-HR
56.	44.00		42.	16.	6.	4.

PEAK STAGE (FEET)	TIME (HR)		MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	99.50-HR
6.83	44.00		6.12	2.69	0.96	0.70

CUMULATIVE AREA = 5.90 SQ MI

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40 KK        A6        DEVELOP LOCAL INFLOW HYDROGRAPH - BASS LAKE TO BLAIR LAKE

     SUBBASIN RUNOFF DATA

41 LA          SUBBASIN CHARACTERISTICS
                 TAREA        5.00  SUBBASIN AREA

42 LF          BASE FLOW CHARACTERISTICS
                 STRTQ       15.00  INITIAL FLOW
                 QRCSN       15.00  BEGIN BASE FLOW RECESSION
                 RTIOR     1.00000  RECESSION CONSTANT
```

PRECIPITATION DATA

43 PM PRUBABLE MAXIMUM STURM

PMS	22.20	INDEX PRECIPITATION
TRSPC	0.80	TRANSPOSITION COEFFICIENT
TRSDA	5.00	TRANSPOSITION AREA
SWD	NO	USE SWD DISTRIBUTION

PERCENT OF INDEX PRECIPITATION OCCURRING IN GIVEN TIME

6-HR	12-HR	24-HR	48-HR	72-HR	96-HR
112.0	123.0	133.0	142.0	0.0	0.0

44 LU UNIFORM LOSS RATE

STRTL	1.00	INITIAL LOSS
CNSTL	0.15	UNIFORM LOSS RATE
RTIMP	0.0	PERCENT IMPERVIOUS AREA

45 UD SCS DIMENSIONLESS UNITGRAPH

TLAG	3.16	LAG

***

UNIT HYDROGRAPH
34 END-OF-PERIOD ORDINATES

44.	130.	265.	450.	607.	693.	707.	671.	598.	506.
388.	296.	232.	185.	147.	116.	91.	72.	56.	44.
35.	27.	22.	17.	13.	10.	8.	7.	6.	4.
3.	2.	1.	0.						

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
10401.	43.00	(CFS)	7950.	2728.	929.	676.
		(INCHES)	14.783	20.288	20.723	20.851
		(AC-FT)	3942.	5410.	5526.	5560.

CUMULATIVE AREA = 5.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION A6
FOR PLAN 1. RATIO = 1.00

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
10401.	43.00	(CFS)	7950.	2728.	929.	676.
		(INCHES)	14.783	20.288	20.723	20.851
		(AC-FT)	3942.	5410.	5526.	5560.

CUMULATIVE AREA = 5.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION A6
FOR PLAN 1. RATIO = 0.50

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
5200.	43.00	(CFS)	3975.	1364.	464.	338.
		(INCHES)	7.391	10.144	10.361	10.425
		(AC-FT)	1971.	2705.	2763.	2780.

CUMULATIVE AREA = 5.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION A6
FOR PLAN 1, RATIO = 0.25

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	99.50-HR
2600.	43.00	(CFS)	1957.	682.	232.	169.
		(INCHES)	3.696	5.072	5.181	5.213
		(AC-FT)	986.	1353.	1382.	1390.

CUMULATIVE AREA = 5.00 SQ MI

HYDROGRAPH AT STATION A6
FOR PLAN 1, RATIO = 0.10

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	99.50-HR
1040.	43.00	(CFS)	795.	273.	93.	68.
		(INCHES)	1.478	2.029	2.072	2.085
		(AC-FT)	394.	541.	553.	556.

CUMULATIVE AREA = 5.00 SQ MI

46 KK A7 COMBINE HYDROGRAPHS TO GET TOTAL INFLOW TO BLAIR LAKE

47 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION A7
FOR PLAN 1, RATIO = 1.00

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	99.50-HR
21537.	43.50	(CFS)	16800.	5930.	2019.	1468.
		(INCHES)	14.330	20.232	20.662	20.759
		(AC-FT)	8331.	11761.	12012.	12068.

CUMULATIVE AREA = 10.90 SQ MI

HYDROGRAPH AT STATION A7
FOR PLAN 1, RATIO = 0.50

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	99.50-HR
10659.	43.50	(CFS)	8332.	2961.	1010.	734.
		(INCHES)	7.107	10.104	10.333	10.385
		(AC-FT)	4132.	5874.	6007.	6037.

CUMULATIVE AREA = 10.90 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION A7
FOR PLAN 1, RATIO = 0.25

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
5246.	43.50	(CFS)	4191.	1478.	505.	367.
		(INCHES)	3.532	5.042	5.166	5.192
		(AC-FT)	2053.	2931.	3003.	3018.

CUMULATIVE AREA = 10.90 SQ MI

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HYDROGRAPH AT STATION A7
FOR PLAN 1, RATIO = 0.10

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
2085.	43.50	(CFS)	1668.	569.	202.	147.
		(INCHES)	1.423	2.011	2.067	2.077
		(AC-FT)	827.	1169.	1202.	1208.

CUMULATIVE AREA = 10.90 SQ MI

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48 KK — A6 — ROUTE INFLOW HYDROGRAPH THROUGH BLAIR LAKE

HYDROGRAPH ROUTING DATA

49 KS — STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	STOR	TYPE OF INITIAL CONDITION
RSVRIC	24.00	INITIAL CONDITION
X	0.0	WORKING R AND D COEFFICIENT

52 SV	STORAGE	0.0	24.0	30.0	40.0	60.0	80.0	109.0	142.0	193.0	235.0
53 SE	ELEVATION	340.70	355.00	356.00	357.00	359.00	361.00	363.00	365.20	368.00	370.00
50 SQ	DISCHARGE	0.	0.	123.	348.	984.	2253.	4122.	6746.	13345.	21421.
51 SE	ELEVATION	340.70	355.00	356.00	357.00	359.00	361.00	363.00	365.20	368.00	370.00

54 SS — SPILLWAY

CREL	355.00	SPILLWAY CREST ELEVATION
SPWID	41.00	SPILLWAY WIDTH
COSW	3.00	WEIR COEFFICIENT
EXPW	1.50	EXPONENT OF HEAD

55 ST — TOP OF DAM

TOPEL	359.00	ELEVATION AT TOP OF DAM
DAMWID	59.00	DAM WIDTH
COOD	0.0	WEIR COEFFICIENT
EXPD	1.50	EXPONENT OF HEAD

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COMPUTED STORAGE-OUTFLOW CURVE

STORAGE	0.0	24.00	30.00	40.00	60.00	80.00	109.00	142.00	193.00	235.00
OUTFLOW	0.0	0.0	123.00	348.00	984.00	2253.00	4122.00	6748.00	13345.00	21421.00

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HYDROGRAPH AT STATION A8
FOR PLAN 1, RATIO = 1.00

PEAK OUTFLOW IS 21554. AT TIME 43.50 HOURS

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	99.50-HR
21554.	43.50	(CFS)	16760.	5928.	2019.	1467.
		(INCHES)	14.313	20.228	20.662	20.756
		(AC-FT)	8321.	11759.	12011.	12066.

PEAK STORAGE (AC-FT)	TIME (HR)	6-HR	MAXIMUM AVERAGE STORAGE 24-HR	72-HR	99.50-HR
236.	43.50	210.	106.	54.	46.

PEAK STAGE (FEET)	TIME (HR)	6-HR	MAXIMUM AVERAGE STAGE 24-HR	72-HR	99.50-HR
370.03	43.50	368.74	362.20	357.73	357.02

CUMULATIVE AREA = 10.90 SQ MI

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HYDROGRAPH AT STATION A8
FOR PLAN 1, RATIO = 0.50

PEAK OUTFLOW IS 10652. AT TIME 43.50 HOURS

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	99.50-HR
10652.	43.50	(CFS)	8313.	2961.	1039.	734.
		(INCHES)	7.090	10.101	10.333	10.383
		(AC-FT)	4122.	5872.	6007.	6036.

PEAK STORAGE (AC-FT)	TIME (HR)	6-HR	MAXIMUM AVERAGE STORAGE 24-HR	72-HR	99.50-HR
172.	43.50	153.	80.	44.	39.

PEAK STAGE (FEET)	TIME (HR)	6-HR	MAXIMUM AVERAGE STAGE 24-HR	72-HR	99.50-HR
366.56	43.50	365.73	360.29	356.95	356.43

CUMULATIVE AREA = 10.90 SQ MI

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HYDROGRAPH AT STATION A8
FOR PLAN 1. RATIO = 0.25

PEAK OUTFLOW IS 5226. AT TIME 43.50 HOURS

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	99.50-HR
5226.	43.50	(CFS)	4136.	1477.	505.	367.
		(INCHES)	3.528	5.041	5.166	5.191
		(AC-FT)	2051.	2931.	3003.	3018.

PEAK STORAGE (AC-FT)	TIME (HR)		MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	99.50-HR
123.	43.50		109.	60.	37.	33.

PEAK STAGE (FEET)	TIME (HR)		MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	99.50-HR
365.93	43.50		362.90	358.72	356.34	355.98

CUMULATIVE AREA = 10.90 SQ MI

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HYDROGRAPH AT STATION A8
FOR PLAN 1. RATIO = 0.10

PEAK OUTFLOW IS 2074. AT TIME 43.50 HOURS

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	99.50-HR
2074.	43.50	(CFS)	1664.	549.	202.	147.
		(INCHES)	1.419	2.010	2.067	2.077
		(AC-FT)	825.	1169.	1201.	1207.

PEAK STORAGE (AC-FT)	TIME (HR)		MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	99.50-HR
77.	43.50		71.	43.	31.	29.

PEAK STAGE (FEET)	TIME (HR)		MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	99.50-HR
360.72	43.50		360.05	357.22	355.78	355.57

CUMULATIVE AREA = 10.90 SQ MI

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND. AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIO 1	RATIOS APPLIED TO FLOWS RATIO 2	RATIO 3	RATIO 4
					1.00	0.50	0.25	0.10
HYDROGRAPH AT	A1	5.90	1	FLOW	12000.	6000.	3000.	1200.
				TIME	43.00	43.00	43.00	43.00
ROUTED TO	A2	5.90	1	FLOW	11982.	5987.	2987.	1185.
				TIME	43.00	43.00	43.00	43.50
			** PEAK STAGES IN FEET **					
			1	STAGE	110.83	107.58	105.56	103.64
				TIME	43.00	43.00	43.00	43.50
ROUTED TO	A3	5.90	1	FLOW	11980.	5989.	2984.	1186.
				TIME	43.00	43.00	43.00	43.50
			** PEAK STAGES IN FEET **					
			1	STAGE	13.14	9.91	7.18	4.12
				TIME	43.00	43.00	43.00	43.50
ROUTED TO	A4	5.90	1	FLOW	11910.	5952.	2976.	1188.
				TIME	43.00	43.00	43.50	43.50
			** PEAK STAGES IN FEET **					
			1	STAGE	18.21	13.57	10.28	6.67
				TIME	43.00	43.00	43.50	43.50
ROUTED TO	A5	5.90	1	FLOW	11597.	5751.	2834.	1125.
				TIME	44.00	44.00	44.00	44.00
			** PEAK STAGES IN FEET **					
			1	STAGE	14.33	11.64	9.41	6.83
				TIME	44.00	44.00	44.00	44.00
HYDROGRAPH AT	A6	5.00	1	FLOW	10401.	5200.	2600.	1040.
				TIME	43.00	43.00	43.00	43.00
2 COMBINED AT	A7	10.90	1	FLOW	21537.	10659.	5246.	2085.
				TIME	43.50	43.50	43.50	43.50
ROUTED TO	A8	10.90	1	FLOW	21554.	10652.	5226.	2074.
				TIME	43.50	43.50	43.50	43.50
			** PEAK STAGES IN FEET **					
			1	STAGE	370.03	366.86	363.93	360.72
				TIME	43.50	43.50	43.50	43.50

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION A8

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	355.00	355.00	359.00
STORAGE	24.	24.	60.
OUTFLOW	0.	0.	984.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	370.03	11.03	236.	21564.	15.50	43.50	0.0
0.50	366.85	7.86	172.	10652.	12.50	43.50	0.0
0.25	363.93	4.93	123.	5226.	10.00	43.50	0.0
0.10	360.72	1.72	77.	2074.	6.00	43.50	0.0

*** NORMAL END OF JOB ***

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LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   1            ID     BLAIR LAKE DAM    BREACH ANALYSIS    TOM GOOCH    ANCO
   2            ID     NEW JERSEY DAM NO. 774 - WARREN COUNTY - BLAIRSTOWN TOWNSHIP
   3            IT        1               0       60
   4            IO        2         1

   5            KK       A1   INPUT INFLOW HYDROGRAPH
   6            QI     980.     980.     980.     980.     990.     990.

   7            KK       A2   ROUTE INFLOW HYDROGRAPH THROUGH BLAIR LAKE
   8            KO        2         2
   9            RS        1     FLOW     980.
  10            SQ       0.       0.     123.     348.     984.    2253.    4122.    6748.   13345.   21421.
  11            SE    340.7     355.     356.     357.     359.     361.     363.    365.2     368.     370.
  12            SV       0.      24.      30.      40.      60.      80.     109.     142.     193.     235.
  13            SE    340.7     355.     356.     357.     359.     361.     363.    365.2     368.     370.
  14            SS     355.      41.      3.0      1.5
  15            ST     359.      59.      0.0      1.5
  16            SB    340.7      30.     0.33      0.5     359.

  17            KK       A3   ROUTE OUTFLOW HYDROGRAPH THROUGH BLAIRSTOWN
  18            KO        2         2
  19            RS        1     FLOW     980.
  20            RC      .10      .04      .10     840.     .011
  21            RX       0.     250.    499.9     500.     520.    520.1     770.    1020.
  22            RY      10.      11.       6.       0.       0.       6.      11.      16.
  23            ZZ
```

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                                   (HEC-1)
                                 1981

                                 TIME14.11.09

                                                               U.S. ARMY CORPS OF ENGINEERS
                                                             THE HYDROLOGIC ENGINEERING CENTER
                                                                    609 SECOND STREET
                                                                 DAVIS, CALIFORNIA 95616
                                                             (916) 440-3285 OR (FTS) 448-3285

                BLAIR LAKE DAM    BREACH ANALYSIS    TOM GEUCH    ANCO
                NEW JERSEY DAM NO. 774 - WARREN COUNTY - BLAIRSTOWN TOWNSHIP

 4 IO        OUTPUT CONTROL VARIABLES
                  IPRNT          4   PRINT CONTROL
                  IPLOT          1   PLOT CONTROL
                  QSCAL         0.   HYDROGRAPH PLOT SCALE
                  IPRSG        YES   PRINT DIAGNOSTIC MESSAGES

   IT        HYDROGRAPH TIME DATA
                   NMIN          1   MINUTES IN COMPUTATION INTERVAL
                  IDATE    1     0   STARTING DATE
                  ITIME       0000   STARTING TIME
                     NQ         60   NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE    1     0   ENDING DATE
                 NDTIME       0059   ENDING TIME

             COMPUTATION INTERVAL    0.02 HOURS
                  TOTAL TIME BASE    0.98 HOURS

      ENGLISH UNITS
          DRAINAGE AREA           SQUARE MILES
          PRECIPITATION DEPTH     INCHES
          LENGTH, ELEVATION       FEET
          FLOW                    CUBIC FEET PER SECOND
          STORAGE VOLUME          ACRE-FEET
          SURFACE AREA            ACRES
          TEMPERATURE             DEGREES FAHRENHEIT

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          ***************
          *             *
 5 KK     *      A1     *      INPUT INFLOW HYDROGRAPH
          *             *
          ***************

             SUBBASIN RUNOFF DATA

 6 BA          SUBBASIN CHARACTERISTICS
                  TAREA          0.0   SUBBASIN AREA

                                                ***

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                              HYDROGRAPH AT STATION        A1
```

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	990.	1		0015	16	990.	1		0030	31	990.	1		0045	46	990
1		0001	2	990.	1		0016	17	990.	1		0031	32	990.	1		0046	47	990
1		0002	3	990.	1		0017	18	990.	1		0032	33	990.	1		0047	48	990
1		0003	4	990.	1		0018	19	990.	1		0033	34	990.	1		0048	49	990
1		0004	5	990.	1		0019	20	990.	1		0034	35	990.	1		0049	50	990
1		0005	6	990.	1		0020	21	990.	1		0035	36	990.	1		0050	51	990
1		0006	7	990.	1		0021	22	990.	1		0036	37	990.	1		0051	52	990
1		0007	8	990.	1		0022	23	990.	1		0037	38	990.	1		0052	53	990
1		0008	9	990.	1		0023	24	990.	1		0038	39	990.	1		0053	54	990
1		0009	10	990.	1		0024	25	990.	1		0039	40	990.	1		0054	55	990
1		0010	11	990.	1		0025	26	990.	1		0040	41	990.	1		0055	56	990
1		0011	12	990.	1		0026	27	990.	1		0041	42	990.	1		0056	57	990
1		0012	13	990.	1		0027	28	990.	1		0042	43	990.	1		0057	58	990
1		0013	14	990.	1		0028	29	990.	1		0043	44	990.	1		0058	59	990
1		0014	15	990.	1		0029	30	990.	1		0044	45	990.	1		0059	60	990

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	0.98-HR
990.	0.07	(CFS)	989.	989.	989.	989.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	80.	80.	80.	80.

CUMULATIVE AREA = 0.0 SQ MI

7 KK — A2 — ROUTE INFLOW HYDROGRAPH THROUGH BLAIR LAKE

8 KO OUTPUT CONTROL VARIABLES

IPRNT	2	PRINT CONTROL
IPLOT	2	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

9 RS STORAGE ROUTING

NSTPS	1	NUMBER OF SUBREACHES
ITYP	FLOW	TYPE OF INITIAL CONDITION
RSVRIC	980.00	INITIAL CONDITION
X	0.0	WORKING R AND D COEFFICIENT

12 SV	STORAGE	0.0	24.0	30.0	40.0	60.0	80.0	109.0	142.0	193.0	235.0
13 SE	ELEVATION	340.70	355.00	356.00	357.00	359.00	361.00	363.00	365.20	368.00	370.00
10 SQ	DISCHARGE	0.	0.	123.	348.	984.	2253.	4122.	6748.	13345.	21421.
11 SE	ELEVATION	340.70	355.00	356.00	357.00	359.00	361.00	363.00	365.20	368.00	370.00

14 SS SPILLWAY

CREL	355.00	SPILLWAY CREST ELEVATION
SPWID	41.00	SPILLWAY WIDTH
COQW	3.00	WEIR COEFFICIENT
EXPW	1.50	EXPONENT OF HEAD

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15 ST          TOP OF DAM
                   TOPEL      359.00  ELEVATION AT TOP OF DAM
                   DAMWID      60.00  DAM WIDTH
                   COQD         3.0   WEIR COEFFICIENT
                   EXPD         1.50  EXPONENT OF HEAD

16 SB          BREACH DATA
                   ELBM       340.70  ELEVATION AT BOTTOM OF BREACH
                   BRWID       30.00  WIDTH OF BREACH BOTTOM
                   Z            0.33  BREACH SIDE SLOPE
                   TFAIL        0.50  TIME FOR BREACH TO DEVELOP
                   FAILEL     359.02  W.S. ELEVATION TO TRIGGER FAILURE
                                  ***
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COMPUTED STORAGE-OUTFLOW CURVE

STORAGE	0.0	24.00	30.00	40.00	60.00	80.00	109.00	142.00	193.00	235.00
OUTFLOW	0.0	0.0	123.00	348.00	984.00	2253.00	4122.00	6748.00	13345.00	21421.00

BEGIN DAM FAILURE AT 0.28 HOURS

HYDROGRAPH AT STATION A2

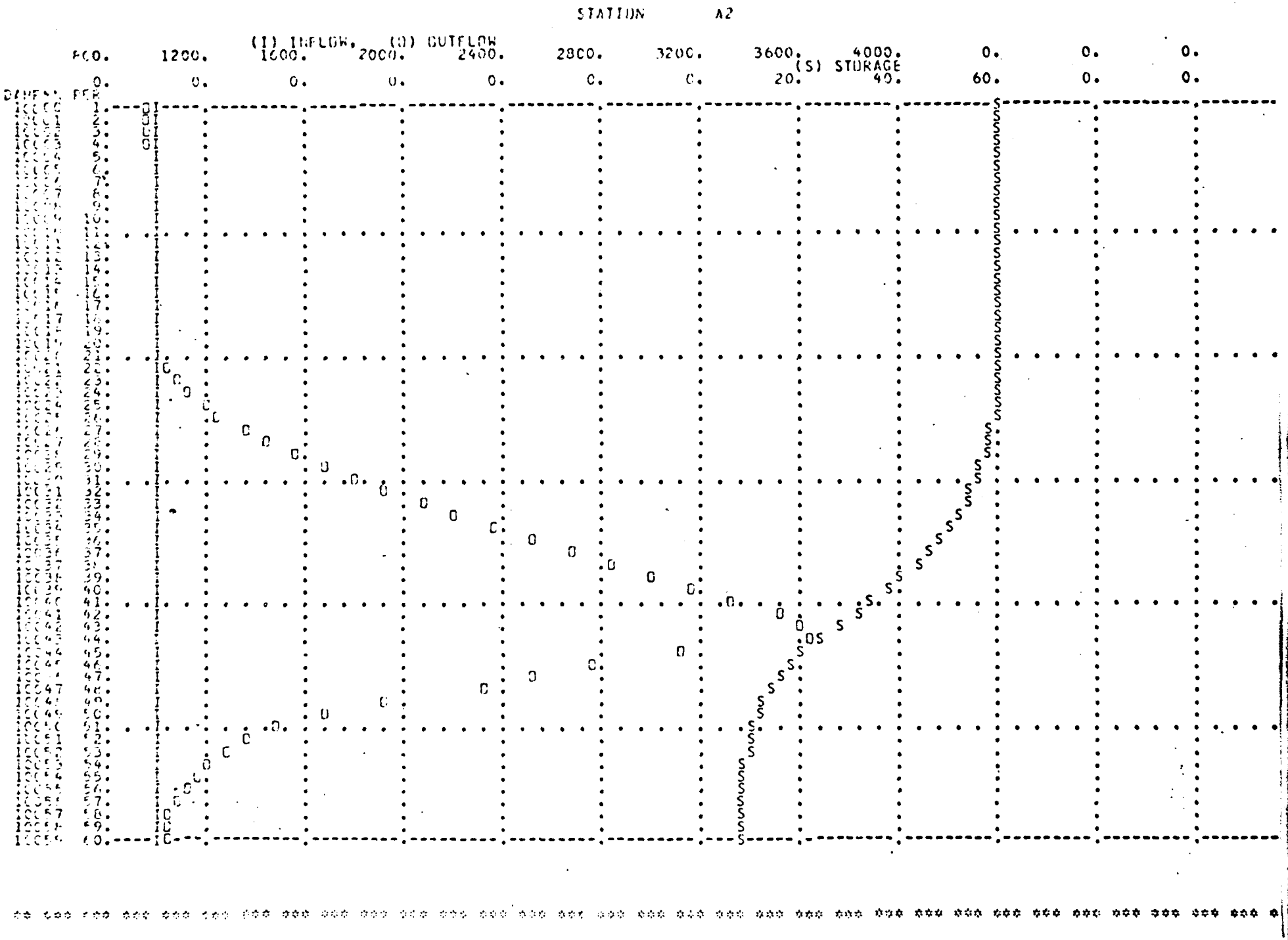
DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STA
1		0000	1	980.	59.9	359.0	1		0020	21	1010.	60.0	359.0	1		0040	41	3323.	34.4	356
1		0001	2	980.	59.9	359.0	1		0021	22	1030.	59.9	359.0	1		0041	42	3504.	31.1	356
1		0002	3	980.	59.9	359.0	1		0022	23	1074.	59.8	359.0	1		0042	43	3596.	27.5	355
1		0003	4	980.	59.9	359.0	1		0023	24	1122.	59.7	359.0	1		0043	44	3632.	23.9	354
1		0004	5	980.	59.9	359.0	1		0024	25	1183.	59.5	358.9	1		0044	45	3103.	20.6	353
1		0005	6	981.	59.9	359.0	1		0025	26	1257.	59.2	358.9	1		0045	46	2749.	18.0	351
1		0006	7	981.	59.9	359.0	1		0026	27	1342.	58.7	358.9	1		0046	47	2503.	15.7	350
1		0007	8	981.	59.9	359.0	1		0027	28	1438.	58.2	358.8	1		0047	48	2230.	13.8	348
1		0008	9	982.	59.9	359.0	1		0028	29	1546.	57.5	358.7	1		0048	49	1932.	12.2	348
1		0009	10	982.	59.9	359.0	1		0029	30	1663.	56.6	358.7	1		0049	50	1667.	11.1	347
1		0010	11	982.	59.9	359.0	1		0030	31	1790.	55.6	358.6	1		0050	51	1484.	10.3	346
1		0011	12	983.	60.0	359.0	1		0031	32	1925.	54.4	358.4	1		0051	52	1355.	9.7	346
1		0012	13	983.	60.0	359.0	1		0032	33	2066.	53.0	358.3	1		0052	53	1262.	9.3	346
1		0013	14	983.	60.0	359.0	1		0033	34	2213.	51.5	358.1	1		0053	54	1194.	9.0	346
1		0014	15	983.	60.0	359.0	1		0034	35	2364.	49.7	358.0	1		0054	55	1144.	8.7	345
1		0015	16	984.	60.0	359.0	1		0035	36	2518.	47.7	357.8	1		0055	56	1107.	8.5	345
1		0016	17	984.	60.0	359.0	1		0036	37	2673.	45.5	357.5	1		0056	57	1079.	8.4	345
1		0017	18	984.	60.0	359.0	1		0037	38	2829.	43.0	357.3	1		0057	58	1058.	8.3	345
1		0018	19	990.	60.0	359.0	1		0038	39	2984.	40.4	357.0	1		0058	59	1042.	8.2	345
1		0019	20	994.	60.0	359.0	1		0039	40	3139.	37.5	356.8	1		0059	60	1029.	8.1	345

PEAK OUTFLOW IS 3632. AT TIME 0.72 HOURS

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	0.98-HR
3632.	0.72	(CFS)	1626.	1626.	1626.	1626.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	132.	132.	132.	132.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	0.98-HR
60.	0.30	43.	43.	43.	43.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	0.98-HR
359.0	0.30	355.52	355.52	355.52	355.52


STATION A2
(I) INFLOW, (O) OUTFLOW
(S) STORAGE
FLOW
STORAGE
0. 400. 800. 1200. 1600. 2000. 2400. 2800. 3200. 3600. 4000.
0. 0. 0. 0. 0. 0. 0. 0. 0. 20. 40. 60.
0. 0. 0.

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*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
17 KK         *     A3     *     ROUTE OUTFLOW HYDROGRAPH THROUGH PLAINSTOWN
              *            *
              **************

18 KO             OUTPUT CONTROL VARIABLES
                        IPRNT            2  PRINT CONTROL
                        IPLOT            2  PLOT CONTROL
                        QSCAL           0.  HYDROGRAPH PLOT SCALE

                 HYDROGRAPH ROUTING DATA

19 RS               STORAGE ROUTING
                        NSTPS            1  NUMBER OF SUBREACHES
                        ITYP          FLOW  TYPE OF INITIAL CONDITION
                        RSVRIC      980.00  INITIAL CONDITION
                        X             0.0   WORKING R AND D COEFFICIENT

20 RC               NORMAL DEPTH CHANNEL ROUTING
                        ANL         0.100   LEFT OVERBANK N-VALUE
                        ANCH        0.040   MAIN CHANNEL N-VALUE
                        ANR         0.100   RIGHT OVERBANK N-VALUE
                        RLNTH         840.  REACH LENGTH
                        SEL        0.0110   ENERGY SLOPE
                        ELMAX         0.0   MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                            CROSS-SECTION DATA
                              --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
22 RY      ELEVATION     16.00     11.00      6.00      0.0       0.0       6.00     11.00     16.00
21 RX      DISTANCE       0.0     250.00    499.90    500.00    520.00    520.10    770.00   1020.00

                                                    ***

                                       COMPUTED STORAGE-OUTFLOW CURVE
    STORAGE          0.0       0.33      0.65      0.98      1.30      1.63      1.96      2.28      3.14      5.34
                     8.92     13.06     20.17     27.84     36.69     47.30     59.07     72.22     86.73    102.61

    OUTFLOW          0.0      55.66    168.32    316.20    489.62    682.65    891.26   1112.57   1407.03   1853.39
                  2532.10   3512.44   4655.21   6616.30   8848.04  11599.59  14918.05  18848.43  23434.15  28717.11

    ELEVATION        0.0       0.84      1.69      2.53      3.37      4.21      5.05      5.89      6.74      7.58
                     8.42      9.26     10.11     10.95     11.79     12.63     13.47     14.32     15.16     16.00
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                                        HYDROGRAPH AT STATION      A3

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1		0000	1	980.	2.1	5.4	*	1		0020	21	997.	2.1	5.5	*	1		0040	41	2747.	10.0	8.6
1		0001	2	980.	2.1	5.4	*	1		0021	22	1014.	2.1	5.5	*	1		0041	42	2909.	10.8	8.7
1		0002	3	980.	2.1	5.4	*	1		0022	23	1040.	2.2	5.6	*	1		0042	43	3063.	11.6	8.9
1		0003	4	[illegible]	2.1	5.4	*	1		0023	24	1077.	2.2	5.8	*	1		0043	44	3195.	12.3	9.0
1		[illegible]	5	980.	[illegible]	5.4	*	1		0024	25	1120.	2.3	5.9	*	1		0044	45	32?7.	12.5	9.0
1		[illegible]	6	[illegible]	2.1	5.4	*	1		0025	26	1159.	2.4	6.0	*	1		0045	46	3162.	12.1	9.0
1		[illegible]	7	981.	2.1	5.4	*	1		0026	27	1213.	2.6	6.2	*	1		0046	47	3033.	11.4	8.9
1		0007	8	981.	2.1	5.4	*	1		0027	28	127?.	2.8	6.4	*	1		0047	48	2885.	10.7	8.7
1		[illegible]	9	[illegible]	2.1	5.4	*	1		0028	29	1362.	3.0	6.6	*	1		0048	49	2704.	9.8	8.6
1		[illegible]	10	[illegible]	2.1	5.4	*	1		0029	30	14??.	3.3	6.8	*	1		0049	50	2458.	8.7	8.4
1		[illegible]	11	[illegible]	2.1	5.4	*	1		0030	31	15??.	3.6	6.9	*	1		0050	51	2277.	7.6	8.1
1		[illegible]	12	[illegible]	2.1	5.4	*	1		0031	32	1664.	4.1	7.1	*	1		0051	52	2079.	6.5	7.9
1		[illegible]	13	[illegible]	2.1	5.4	*	1		0032	33	[illegible]	4.5	7.3	*	1		0052	53	1900.	5.6	7.6
1		[illegible]	14	[illegible]	[illegible]	5.4	*	1		[illegible]	34	[illegible]	[illegible]	7.5	*	1		0053	54	1739.	4.8	7.4
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	*	1		[illegible]	[illegible]	[illegible]	[illegible]	7.7	*	1		[illegible]	55	[illegible]	4.1	7.1

1	0015	16	[illegible]	2.1	5.4	*	1	0035	36	2038.	6.3	7.8	*	1	0055	56	1484.	3.5	6.[illegible]
1	0016	17	974.	2.1	5.4	*	1	0036	37	2167.	7.0	8.0	*	1	0056	57	1377.	3.0	6.[illegible]
1	0017	18	964.	2.1	5.4	*	1	0037	38	2302.	7.7	8.1	*	1	0057	58	1258.	2.7	6.[illegible]
1	0018	19	985.	2.1	5.4	*	1	0038	39	2442.	8.4	8.3	*	1	0058	59	1178.	2.5	6.1
1	0019	20	980.	2.1	5.4	*	1	0039	40	2590.	9.2	8.5	*	1	0059	60	1123.	2.3	5.9

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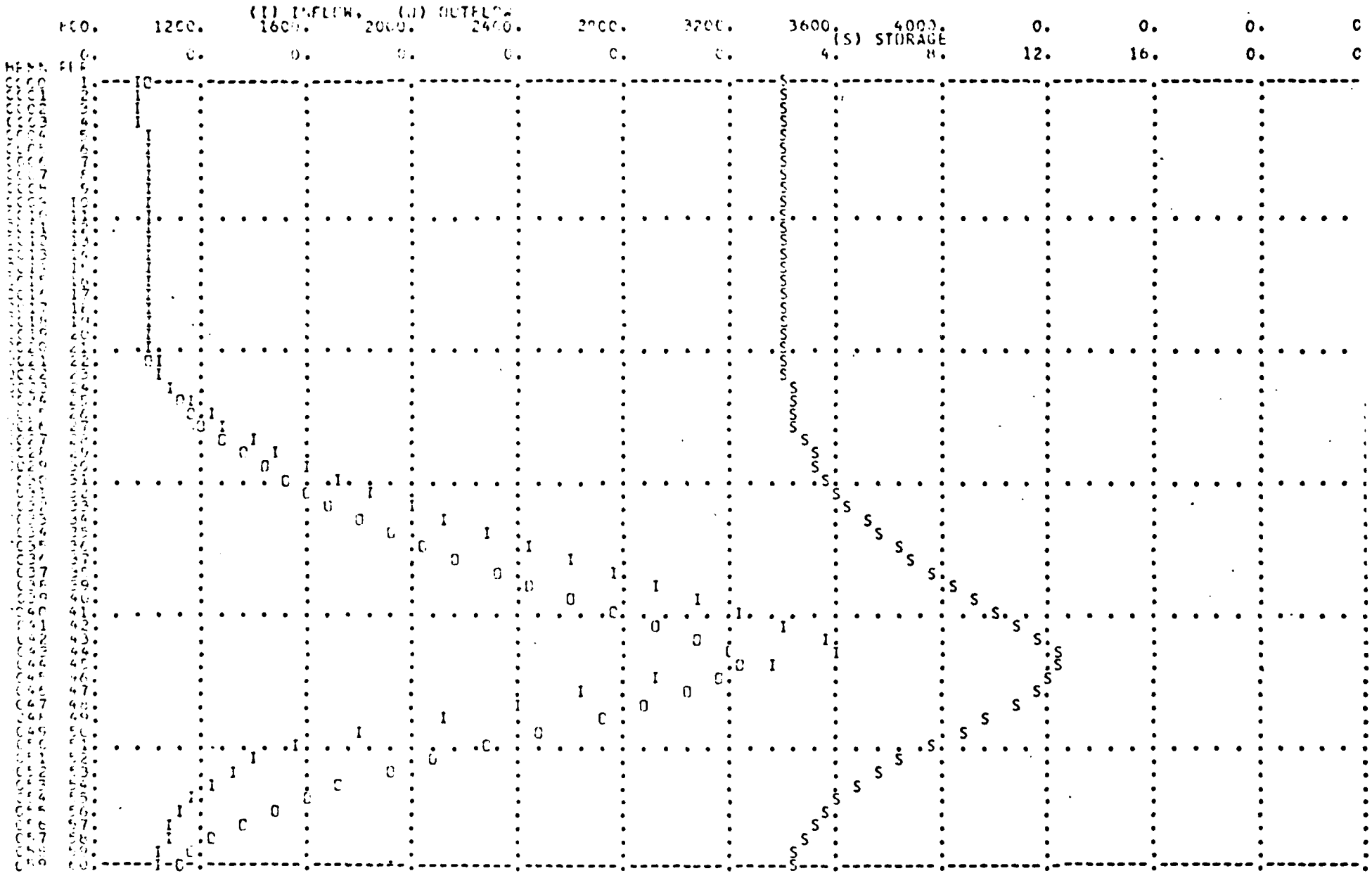
PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	0.98-HR
3237.	0.73	(CFS)	1623.	1623.	1623.	1623.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	132.	132.	132.	132.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	0.98-HR
12.	0.73	5.	5.	5.	5.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	0.98-HR
9.03	0.73	6.73	6.73	6.73	6.73

CUMULATIVE AREA = 0.0 SQ MI

STATION AJ


(I) INFLOW, (O) OUTFLOW
(S) STORAGE
800. 1200. 1600. 2000. 2400. 2800. 3200. 3600. 4000.
0. 0. 0. 0. 0. 0. 4. 8. 12. 16. 0. 0.

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	A1	990.	0.67	989.	989.	989.	0.0		
ROUTED TO	A2	3632.	0.72	1626.	1626.	1626.	0.0	359.00	0.30
ROUTED TO	A3	3297.	0.73	1623.	1623.	1623.	0.0	9.03	0.73

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION A2

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	358.99	359.00	359.00
STORAGE	60.	24.	60.
OUTFLOW	980.	5019.	9371.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	359.00	0.00	60.	3632.	0.03	0.72	0.28

*** NORMAL END OF JOB ***

HEC-1 INPUT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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID    BLAIR LAKE DAM    OVERTOPPING ANALYSIS    TOM GOOCH    ANCO
  2           ID    NEW JERSEY DAM NO. 774 - WARREN COUNTY - BLAIRSTOWN TOWNSHIP
  3           ID    0.1,0.25,0.5,1.0 MULTIPLES OF PMF FROM 24-HOUR PMP
  4           IT       15               0      200
  5           IO        3       1
  6           JR    FLOW      1.0
  7           KK       A1   BASS LAKE INFLOW HYDROGRAPH - INPUT TAKEN FROM BASS LAKE REPORT
  8           KM     INFLOW FROM SCS UNIT GRAPH COMPUTATIONS
  9           KO        3
 10           BA     5.90       0
 11           PB     11.8     0.0       1
 12           PM     22.2                      NO      112      123      133      142
 13           LU        1    0.15
 14           UD      3.3
 15           KK       A2   ROUTE INFLOW HYDROGRAPH THROUGH BASS LAKE - INPUT FROM BASS LK REP
 16           KO        3
 17           RS        1    ELEV   100.1
 18           SV        0    16.2    32.6    49.9    67.3    84.6    102.    119.    137.    154.
 19           SE    100.1   101.1   102.1   103.1   104.1   105.1   106.1   107.1   108.1   109.1
 20           SQ       0.     63.    355.    786.   1511.   2422.   3639.   5137.   6921.   8777.
 21           SE    100.1   101.1   102.1   103.1   104.1   105.1   106.1   107.1   108.1   109.1
 22           KK       A3   ROUTE OUTFLOW HYDROGRAPH FROM BASS LAKE THROUGH REACH 1
 23           KO        3
 24           RS        1    STOR      -1
 25           RC      0.1    0.05     0.1   1630.    0.11
 26           RX       0.     25.    49.9     50.     65.    65.1     90.    115.
 27           RY      15.     10.      5.      0.      0.      5.     10.     15.
 28           KK       A4   ROUTE HYDROGRAPH THROUGH REACH 2
 29           KO        3
 30           RS        1    STOR      -1
 31           RC      0.1    0.05     0.1   6000.   0.023
 32           RX       0.     25.    49.9     50.     65.    65.1     90.    115.
 33           RY      15.     10.      5.      0.      0.      5.     10.     15.
 34           KK       A5   ROUTE HYDROGRAPH THROUGH REACH 3
 35           KO        3
 36           RS        1    STOR      -1
 37           RC      0.1    0.05     0.1  10800.   0.008
 38           RX       0.    125.   249.9    250.    270.   270.1    395.    520.
 39           RY      15.     10.      5.      0.      0.      5.     10.     15.
 40           KK       A6   DEVELOP LOCAL INFLOW HYDROGRAPH - BASS LAKE TO BLAIR LAKE
 41           BA      5.0
 42           PB      15.     15.       1
 43           PM     22.2                      NO      112      123      133      142
 44           LU        1    0.15
 45           UD     3.16
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  46          KK      47  COMBINE HYDROGRAPHS TO GET TOTAL INFLOW TO BLAIR LAKE
  47          HC       2

  48          KK      AH  ROUTE INFLOW HYDROGRAPH THROUGH BLAIR LAKE
  49          RS       1    STOR     24.
  50          SV      0.      0.    123.    349.    984.   2253.   4122.   6749.  13345.  21421.
  51          SE   340.7    355.    356.    357.    359.    361.    363.   365.2    365.    370.
  52          SQ      0.     24.     30.     40.     60.     80.    109.    142.    193.    235.
  53          SE   340.7    355.    356.    357.    359.    361.    363.   365.2    368.    370.
  54          SS    355.     41.     3.0     1.5
  55          ST    354.     64.     0.0     1.5
  56          ZZ
```

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**************************************              **************************************
*                                    *              *                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)*              *   U.S. ARMY CORPS OF ENGINEERS     *
*        FEBRUARY 1981               *              * THE HYDROLOGIC ENGINEERING CENTER  *
*                                    *              *       609 SECOND STREET            *
*  RUN DATE06/29/81   TIME17.03.55   *              *     DAVIS, CALIFORNIA 95616        *
*                                    *              * (916) 440-3285 OR (FTS) 448-3285   *
**************************************              **************************************


              BLAIR LAKE DAM    OVERTOPPING ANALYSIS  -  TOM GOOCH    ANCO
              NEW JERSEY DAM NO. 774 - WARREN COUNTY - BLAIRSTOWN TOWNSHIP
              0.1,0.25,0.5,1.0 MULTIPLES OF PMF FROM 24-HOUR PMP

  5 IO        OUTPUT CONTROL VARIABLES
                   IPRNT           2  PRINT CONTROL
                   IPLOT           1  PLOT CONTROL
                   QSCAL          0.  HYDROGRAPH PLOT SCALE
                   IPRNT         YES  PRINT DIAGNOSTIC MESSAGES

    IT        HYDROGRAPH TIME DATA
                   NMIN           30  MINUTES IN COMPUTATION INTERVAL
                   IDATE      1    0  STARTING DATE
                   ITIME        0000  STARTING TIME
                   NQ            200  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE     5    0  ENDING DATE
                   NDTIME       0330  ENDING TIME

              COMPUTATION INTERVAL    0.50 HOURS
                   TOTAL TIME BASE   99.50 HOURS

          ENGLISH UNITS
              DRAINAGE AREA           SQUARE MILES
              PRECIPITATION DEPTH     INCHES
              LENGTH, ELEVATION       FEET
              FLOW                    CUBIC FEET PER SECOND
              STORAGE VOLUME          ACRE-FEET
              SURFACE AREA            ACRES
              TEMPERATURE             DEGREES FAHRENHEIT

    JP        MULTI-PLAN OPTION
                   NPLAN               1  NUMBER OF PLANS

    JR        MULTI-RATIO OPTION
                   RATIOS OF RUNOFF
              1.00

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          ***************
          *             *
  7 KK    *      A1     *   BASS LAKE INFLOW HYDROGRAPH - INPUT TAKEN FROM BASS LAKE REPORT
          *             *
          ***************
                        INFLOW FROM SCS UNIT GRAPH COMPUTATIONS

  9 KO        OUTPUT CONTROL VARIABLES
                   IPRNT           3  PRINT CONTROL
                   IPLOT           1  PLOT CONTROL
                   QSCAL          0.  HYDROGRAPH PLOT SCALE

              SUBBASIN RUNOFF DATA

 10 BA        SUBBASIN CHARACTERISTICS
                   TAREA        9.49  SUBBASIN AREA
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```
11 BF         BASE FLOW CHARACTERISTICS
                  STRTQ         11.00   INITIAL FLOW
                  QRCSN          0.00 - BEGIN BASE FLOW RECESSION
                  RTIOR        1.00000  RECESSION CONSTANT

              PRECIPITATION DATA

12 PM         PROBABLE MAXIMUM STORM
                    PMS         22.20   INDEX PRECIPITATION
                  TRSPC          0.00   TRANSPOSITION COEFFICIENT
                  TRSDA          5.90   TRANSPOSITION AREA
                    SWD            NO   USE SWD DISTRIBUTION

                 PERCENT OF INDEX PRECIPITATION OCCURRING IN GIVEN TIME
                    6-HR   12-HR   24-HR   48-HR   72-HR   96-HR
                   112.0   123.0   133.0   142.0     0.0     0.0

13 LU         UNIFORM LOSS RATE
                  STRTL         1.00    INITIAL LOSS
                  CNSTL         0.15    UNIFORM LOSS RATE
                  RTIMP         0.0     PERCENT IMPERVIOUS AREA

14 UD         SCS DIMENSIONLESS UNITGRAPH
                   TLAG         3.30    LAG

                                              ***

                                          UNIT HYDROGRAPH
                                      35 END-OF-PERIOD ORDINATES
          47.       139.       278.       474.       662.       765.       802.       782.       709.       619.
         498.       377.       298.       236.       192.       163.       119.        96.        77.        60.
          48.        39.        30.        24.        19.        15.        12.        10.         8.         7.
           5.         4.         3.         2.         1.

    ***              ***              ***              ***              ***

                      HYDROGRAPH AT STATION        A1
                       FOR PLAN 1, RATIO = 0.0

PEAK FLOW      TIME                      MAXIMUM AVERAGE FLOW
  (CFS)        (HR)                6-HR       24-HR       72-HR      99.50-HR
 12000.       43.00     (CFS)      9250.       3211.       1090.        792.
                      (INCHES)    14.577      20.242      20.611      20.696
                       (AC-FT)     4567.       6369.       6486.       6512.

                      CUMULATIVE AREA =     5.90 SQ MI

    ***              ***              ***              ***              ***

                      HYDROGRAPH AT STATION        A1
                       FOR PLAN 1, RATIO = 1.00

PEAK FLOW      TIME                      MAXIMUM AVERAGE FLOW
  (CFS)        (HR)                6-HR       24-HR       72-HR      99.50-HR
 12000.       43.00     (CFS)      9250.       3211.       1090.        792.
                      (INCHES)    14.577      20.242      20.611      20.696
                       (AC-FT)     4567.       6369.       6486.       6512.

                      CUMULATIVE AREA =     5.90 SQ MI

* *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** **
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*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              ***************
              *             *
14 KK         *      A2     *     ROUTE INFLOW HYDROGRAPH THROUGH BASS LAKE - INPUT FROM BASS LK REP
              *             *
              ***************

16 KO         OUTPUT CONTROL VARIABLES
                   IPRNT          3  PRINT CONTROL
                   IPLOT          1  PLOT CONTROL
                   QSCAL         0.  HYDROGRAPH PLOT SCALE

           HYDROGRAPH ROUTING DATA

17 RS         STORAGE ROUTING
                   NSTPS          1  NUMBER OF SUBREACHES
                   ITYP        ELEV  TYPE OF INITIAL CONDITION
                   RSVRIC    100.10  INITIAL CONDITION
                   X            0.0  WORKING R AND D COEFFICIENT

18 SV         STORAGE       0.0     15.2     32.6     49.9     67.3     84.6    102.0    119.0    137.0    154.0

19 SE         ELEVATION   100.10   101.10   102.10   103.10   104.10   105.10   106.10   107.10   108.10   109.10

20 SQ         DISCHARGE      0.      63.     355.     796.    1511.    2422.    3639.    5137.    6921.    8777.

21 SE         ELEVATION   100.10   101.10   102.10   103.10   104.10   105.10   106.10   107.10   108.10   109.10

                                                   ***

                                        COMPUTED STORAGE-OUTFLOW CURVE
         STORAGE     0.0     15.20     32.60     49.90     67.30     84.60    102.00    119.00    137.00    154.00

         OUTFLOW     0.0     63.00    355.00    796.00   1511.00   2422.00   3639.00   5137.00   6921.00   8777.00

** WARNING *** MODIFIED PULS ROUTING WILL BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN    1511. TO    8777.
               USE SHORTER TIME INTERVAL OR LONGER REACH LENGTH

   ***          ***          ***          ***          ***

                        HYDROGRAPH AT STATION        A2
                          FOR PLAN 1, RATIO = 1.00

PEAK FLOW      TIME                              MAXIMUM AVERAGE FLOW
  (CFS)        (HR)                       6-HR       24-HR       72-HR     99.50-HR
  11892.       43.00         (CFS)        9224.      3208.       1090.       792.
                          (INCHES)      14.536     20.219      20.611     20.687
                          (AC-FT)        4574.      6362.       6486.      6509.

PEAK STORAGE   TIME                              MAXIMUM AVERAGE STORAGE
  (AC-FT)      (HR)                       6-HR       24-HR       72-HR     99.50-HR
   193.        43.00                       158.        78.         30.        23.

PEAK STAGE     TIME                              MAXIMUM AVERAGE STAGE
  (FEET)       (HR)                       6-HR       24-HR       72-HR     99.50-HR
  110.73       43.00                     109.33     104.70      101.92     101.47

                        CUMULATIVE AREA =     5.90 SQ MI

** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
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AD-A103 939 NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON --ETC F/G 13/13
NATIONAL DAM SAFETY PROGRAM. BLAIR LAKE DAM (NJ00774), DELAWARE--ETC(U)
AUG 81 W A GUINAN DACW61-79-C-0011
UNCLASSIFIED DAEN/NAP-53842/NJ00774-81/ NL

2 OF 2
AD A
103939

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              **************
              *            *
 22 KK        *     A3     *        ROUTE OUTFLOW HYDROGRAPH FROM BASS LAKE THROUGH REACH 1
              *            *
              **************

 23 KO           OUTPUT CONTROL VARIABLES
                      IPRNT            3  PRINT CONTROL
                      IPLOT            1  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE

              HYDROGRAPH ROUTING DATA

 24 RS           STORAGE ROUTING
                      NSTPS            1  NUMBER OF SUBREACHES
                      ITYP          STOR  TYPE OF INITIAL CONDITION
                      RSVRIC       -1.00  INITIAL CONDITION
                      X             0.0   WORKING R AND D COEFFICIENT

 25 RC           NORMAL DEPTH CHANNEL ROUTING
                      ANL          0.100  LEFT OVERBANK N-VALUE
                      ANCH         0.050  MAIN CHANNEL N-VALUE
                      ANR          0.100  RIGHT OVERBANK N-VALUE
                      RLNTH        1630.  REACH LENGTH
                      SEL         0.1100  ENERGY SLOPE
                      ELMAX         0.0   MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                       CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 27 RY       ELEVATION    15.00      10.00      5.00      0.0       0.0       5.00      10.00      15.00
 26 RX       DISTANCE      0.0       25.00     49.90     50.00     65.00     65.10      90.00     115.00

                                                    ***

                                       COMPUTED STORAGE-OUTFLOW CURVE
         STORAGE       0.0       0.44      0.89      1.33      1.78      2.23      2.68      3.18      3.90      4.85
                       6.03      7.45      9.10     10.98     13.10     15.44     18.02     20.84     23.89     27.17

         OUTFLOW       0.0      93.69    280.42    522.29    802.52   1112.24   1444.16   1646.67   2338.21   2920.77
                    3411.69   4426.11   5377.95   6479.96   7744.44   9103.40  10808.17  12629.64  14658.39  16904.67

         ELEVATION     0.0       0.79      1.58      2.37      3.16      3.95      4.74      5.53      6.32      7.11
                       7.89      8.68      9.47     10.26     11.05     11.84     12.63     13.42     14.21     15.00

*** WARNING *** MODIFIED PULS ROUTING WILL BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO     16905.
                USE SHORTER TIME INTERVAL OR LONGER REACH LENGTH

      ***          ***          ***          ***          ***

                   HYDROGRAPH AT STATION       A3
                     FOR PLAN 1, RATIO = 1.00

PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
  (CFS)        (HR)                     6-HR       24-HR      72-HR     99.50-HR
  11986.      43.00          (CFS)      9276.      3208.      1090.      792.
                          (INCHES)     14.542     20.219     20.611     20.667
                           (AC-FT)      4576.      6362.      6486.      6509.

PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
  (AC-FT)      (HR)                     6-HR       24-HR      72-HR     99.50-HR
    20.       43.00                      15.         5.         2.         1.

PEAK STAGE     TIME                        MAXIMUM AVERAGE STAGE
  (FEET)       (HR)                     6-HR       24-HR      72-HR     99.50-HR
  13.14       43.00                     11.74       5.55       2.02       1.49

                   CUMULATIVE AREA =    5.90 SQ MI
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*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              ***************
              *             *
 28 KK        *      44     *       ROUTE HYDROGRAPH THROUGH REACH 2
              *             *
              ***************

 29 KO              OUTPUT CONTROL VARIABLES
                          IPRNT           3  PRINT CONTROL
                          IPLOT           1  PLOT CONTROL
                          QSCAL          0.  HYDROGRAPH PLOT SCALE

                    HYDROGRAPH ROUTING DATA

 30 RS              STORAGE ROUTING
                          NSTPS           1  NUMBER OF SUBREACHES
                          ITYP         STOR  TYPE OF INITIAL CONDITION
                          RSVRIC      -1.00  INITIAL CONDITION
                          X             0.0  WORKING R AND D COEFFICIENT

 31 RC              NORMAL DEPTH CHANNEL ROUTING
                          ANL         0.100  LEFT OVERBANK N-VALUE
                          ANCH  [illegible]  MAIN CHANNEL N-VALUE
                          ANR         0.100  RIGHT OVERBANK N-VALUE
                          RLNTH       4000.  REACH LENGTH
                          SEL        0.0230  ENERGY SLOPE
                          ELMAX         0.0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                        CROSS-SECTION DATA
                         --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 32 RY       ELEVATION     15.00    10.00     5.00     0.0      0.0      5.00    10.00    15.00
 33 RX       DISTANCE       0.0     25.00    49.90    50.00    65.00    65.10    90.00   115.00

                                                 ***

                                   COMPUTED STORAGE-OUTFLOW CURVE
          STORAGE        0.0      1.63      3.27      4.91      6.55      8.20      9.85     11.69     14.34     17.65
                        22.21     27.42     33.49     40.42     48.20     56.85     66.35     76.71     87.92    100.00

          OUTFLOW        0.0     42.[illegible]    126.23    238.93    367.10    508.59    660.36    844.42   1069.18   1335.56
                      1651.49   2028.90   2459.16   2963.07   3541.26   4199.24   4942.19   5775.09   6702.76   7729.50

          ELEVATION      0.0      0.79      1.58      2.37      3.16      3.95      4.74      5.53      6.32      7.11
                         7.89      8.68      9.47     10.26     11.05     11.84     12.63     13.42     14.21     15.00

*** WARNING *** MODIFIED PULS ROUTING WILL BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN       43. TO       7730.
                USE SHORTER TIME INTERVAL OR LONGER REACH LENGTH

     ***            ***            ***            ***            ***

                    HYDROGRAPH AT STATION        44
                     FOR PLAN 1, RATIO = 1.00
```

(CFS)	(HR)		6-HR	24-HR	72-HR	99.50-HR
11916.	43.00	(CFS)	9207.	3207.	1090.	791.
		(INCHES)	14.957	20.218	20.611	20.665
		(AC-FT)	4961.	6362.	6496.	6509.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	99.50-HR
149.	43.00	114.	42.	15.	11.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	99.50-HR
18.21	43.00	16.14	8.07	3.03	2.24

CUMULATIVE AREA = 5.90 SQ MI

****

34 KK * A5 * ROUTE HYDROGRAPH THROUGH REACH 3

****

35 KO OUTPUT CONTROL VARIABLES
IPRNT 3 PRINT CONTROL
IPLOT 1 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

36 RS STORAGE ROUTING
NSTPS 1 NUMBER OF SUBREACHES
ITYP STOR TYPE OF INITIAL CONDITION
RSVRIC -1.00 INITIAL CONDITION
X 0.0 WEIGHTING R-AND D COEFFICIENT

37 RC NORMAL DEPTH CHANNEL ROUTING
ANL 0.100 LEFT OVERBANK N-VALUE
ANCH 0.050 MAIN CHANNEL N-VALUE
ANR 0.100 RIGHT OVERBANK N-VALUE
RLNTH 10800. REACH LENGTH
SEL 0.0060 ENERGY SLOPE
ELMAX 0.0 MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

CROSS-SECTION DATA

		--- LEFT OVERBANK ---		+ ------ MAIN CHANNEL -------			+ --- RIGHT OVERBANK ---		
38 RY	ELEVATION	15.00	10.00	5.00	0.0	0.0	5.00	10.00	15.00
39 RX	DISTANCE	0.0	125.00	249.90	250.00	270.00	270.10	395.00	520.00

***

COMPUTED STORAGE-OUTFLOW CURVE

STORAGE	0.0	3.92	7.84	11.77	15.71	19.65	23.60	29.27	42.23	62.91
	91.31	127.43	171.28	222.84	282.13	349.14	423.88	506.35	596.54	694.46
OUTFLOW	0.0	34.22	103.77	195.46	303.34	423.78	554.29	712.91	930.29	1232.43
	1644.62	2108.98	2605.67	3753.43	4809.99	6072.16	7556.25	9277.75	11251.71	13492.73
ELEVATION	0.0	0.79	1.58	2.37	3.16	3.95	4.74	5.53	6.32	7.11
	7.89	8.68	9.47	10.26	11.05	11.84	12.63	13.42	14.21	15.00

*** *** *** *** ***

HYDROGRAPH AT STATION A5
FOR PLAN 1, RATIO = 1.00

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
(CFS)	(HR)				
11897.	44.00	9076.	3207.	1090.	791.
	(INCHES)	14.794	20.212	20.611	20.681
	(AC-FT)	4949.	6360.	6495.	6508.

```
MAX STORAGE    TIME                                  MAXIMUM AVERAGE STORAGE
 (AC-FT)       (HR)                      6-HR          24-HR        72-HR       99.50-HR
   612.        44.00                     494.           176.          61.          44.

MAX STAGE      TIME                                  MAXIMUM AVERAGE STAGE
 (FEET)        (HR)                      6-HR          24-HR        72-HR       99.50-HR
  14.33        44.00                    13.25           7.50         2.91         2.17

                    CUMULATIVE AREA =      5.90 SQ MI

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *

            **************
            *            *
 40 KK      *     A6     *      DEVELOP LOCAL INFLOW HYDROGRAPH - BASS LAKE TO BLAIR LAKE
            *            *
            **************

               SUBBASIN RUNOFF DATA

 41 BA            SUBBASIN CHARACTERISTICS
                      TAREA          5.00   SUBBASIN AREA

 42 BF            BASE FLOW CHARACTERISTICS
                      STRTQ         15.00   INITIAL FLOW
                      QRCSN         15.00   BEGIN BASE FLOW RECESSION
                      RTIOR       1.06000   RECESSION CONSTANT

                  PRECIPITATION DATA

 43 PM            PROBABLE MAXIMUM STORM
                      PMS           22.20   INDEX PRECIPITATION
                      TRSPC          0.80   TRANSPOSITION COEFFICIENT
                      TRSDA          5.00   TRANSPOSITION AREA
                      SWD              NO   USE SWD DISTRIBUTION

                    PERCENT OF INDEX PRECIPITATION OCCURRING IN GIVEN TIME
                        6-HR    12-HR    24-HR    48-HR    72-HR    96-HR
                       112.0    123.0    133.0    142.0      0.0      0.0

 44 LU            UNIFORM LOSS RATE
                      STRTL          1.00   INITIAL LOSS
                      CNSTL          0.15   UNIFORM LOSS RATE
                      RTIMP          0.0    PERCENT IMPERVIOUS AREA

 45 UD            SCS DIMENSIONLESS UNITGRAPH
                      TLAG           3.16   LAG

                                                              ***

                                                  UNIT HYDROGRAPH
                                             34 END-OF-PERIOD ORDINATES
             44.        130.        265.        450.        607.        693.        707.        671.        598.        500.
            388.        296.        232.        185.        147.        116.         91.         72.         56.         44.
             35.         27.         22.         17.         13.         10.          8.          7.          6.          4.
              3.          2.          1.          0.
```

HYDROGRAPH AT STATION A6

DA	MON	HRMN	GRD	RAIN	LOSS	EXCESS	COMP Q
1		0000	1	0.0	0.0	0.0	15.
1		0030	2	0.00	0.00	0.00	15.
1		0100	3	0.000	0.000	0.000	15.
1		0130	4	0.000	0.000	0.000	15.
1		0200	5	0.000	0.000	0.000	15.
1		0230	6	0.000	0.000	0.000	15.
1		0300	7	0.000	0.000	0.000	15.
1		0330	8	0.000	0.000	0.000	15.
1		0400	9	0.000	0.000	0.000	15.
1		0430	10	0.000	0.000	0.000	15.
1		0500	11	0.000	0.000	0.000	15.
1		0530	12	0.000	0.000	0.000	15.
1		0600	13	0.000	0.000	0.000	15.
1		0630	14	0.000	0.000	0.000	15.
1		0700	15	0.000	0.000	0.000	15.
1		0730	16	0.000	0.000	0.000	15.
1		0800	17	0.000	0.000	0.000	15.
1		0830	18	0.000	0.000	0.000	15.
1		0900	19	0.000	0.000	0.000	15.
1		0930	20	0.000	0.000	0.000	15.
1		1000	21	0.000	0.000	0.000	15.
1		1030	22	0.000	0.000	0.000	15.
1		1100	23	0.000	0.000	0.000	15.
1		1130	24	0.000	0.000	0.000	15.
1		1200	25	0.000	0.000	0.000	15.
1		1230	26	0.000	0.000	0.000	15.
1		1300	27	0.000	0.000	0.000	15.
1		1330	28	0.000	0.000	0.000	15.
1		1400	29	0.000	0.000	0.000	15.
1		1430	30	0.000	0.000	0.000	15.
1		1500	31	0.000	0.000	0.000	15.
1		1530	32	0.000	0.000	0.000	15.
1		1600	33	0.000	0.000	0.000	15.
1		1630	34	0.000	0.000	0.000	15.
1		1700	35	0.000	0.000	0.000	15.
1		1730	36	0.000	0.000	0.000	15.
1		1800	37	0.000	0.000	0.000	15.
1		1830	38	0.000	0.000	0.000	15.
1		1900	39	0.000	0.000	0.000	15.
1		1930	40	0.000	0.000	0.000	15.
1		2000	41	0.000	0.000	0.000	15.
1		2030	42	0.000	0.000	0.000	15.
1		2100	43	0.000	0.000	0.000	15.
1		2130	44	0.000	0.000	0.000	15.
1		2200	45	0.000	0.000	0.000	15.
1		2230	46	0.000	0.000	0.000	15.
1		2300	47	0.000	0.000	0.000	15.
1		2330	48	0.000	0.000	0.000	15.
2		0000	49	0.000	0.000	0.000	15.
2		0030	50	0.000	0.000	0.000	15.
2		0100	51	0.000	0.000	0.000	15.
2		0130	52	0.000	0.000	0.000	15.
2		0200	53	0.000	0.000	0.000	15.
2		0230	54	0.000	0.000	0.000	15.
2		0300	55	0.000	0.000	0.000	15.
2		0330	56	0.000	0.000	0.000	15.
2		0400	57	0.000	0.000	0.000	15.
2		0430	58	0.000	0.000	0.000	15.
2		0500	59	0.000	0.000	0.000	15.
2		0530	60	0.000	0.000	0.000	15.
2		0600	61	0.000	0.000	0.000	15.
2		0630	62	0.000	0.000	0.000	15.
2		0700	63	0.000	0.000	0.000	15.
2		0730	64	0.000	0.000	0.000	15.
2		0800	65	0.000	0.000	0.000	15.
2		0830	66	0.000	0.000	0.000	15.
2		0900	67	0.000	0.000	0.000	15.
2		0930	68	0.000	0.000	0.000	15.
2		1000	69	0.000	0.000	0.000	15.
2		1030	70	0.000	0.000	0.000	15.
2		1100	71	0.000	0.000	0.000	15.
2		1130	72	0.000	0.000	0.000	15.
2		1200	73	0.000	0.000	0.000	15.
2		1230	74	0.000	0.000	0.000	15.
2		1300	75	0.000	0.000	0.000	15.
2		1330	76	0.000	0.000	0.000	15.
2		1400	77	0.000	0.000	0.000	15.
2		1430	78	0.000	0.000	0.000	15.
2		1500	79	0.000	0.000	0.000	15.
2		1530	80	0.000	0.000	0.000	15.
2		1600	81	0.000	0.000	0.000	15.
2		1630	82	0.000	0.000	0.000	15.
2		1700	83	0.000	0.000	0.000	15.
2		1730	84	0.000	0.000	0.000	15.
2		1800	85	0.000	0.000	0.000	15.
2		1830	86	0.000	0.000	0.000	15.
2		1900	87	0.000	0.000	0.000	15.
2		1930	88	0.000	0.000	0.000	15.
2		2000	89	0.000	0.000	0.000	15.
2		2030	90	0.000	0.000	0.000	15.
2		2100	91	0.000	0.000	0.000	15.
2		2130	92	0.000	0.000	0.000	15.
2		2200	93	0.000	0.000	0.000	15.
2		2230	94	0.000	0.000	0.000	15.
2		2300	95	0.000	0.000	0.000	15.
2		2330	96	0.000	0.000	0.000	15.
3		0000	97	0.000	0.000	0.000	15.
3		0030	98	0.000	0.000	0.000	15.
3		0100	99	0.000	0.000	0.000	15.
3		0130	100	0.000	0.000	0.000	15.
3		0200	101	0.0	0.0	0.0	717.
3		0230	102	0.00	0.00	0.00	575.
3		0300	103	0.000	0.000	0.000	460.
3		0330	104	0.000	0.000	0.000	366.
3		0400	105	0.000	0.000	0.000	291.
3		0430	106	0.000	0.000	0.000	231.
3		0500	107	0.000	0.000	0.000	185.
3		0530	108	0.000	0.000	0.000	146.
3		0600	109	0.000	0.000	0.000	116.
3		0630	110	0.000	0.000	0.000	92.
3		0700	111	0.000	0.000	0.000	73.
3		0730	112	0.000	0.000	0.000	58.
3		0800	113	0.000	0.000	0.000	46.
3		0830	114	0.000	0.000	0.000	37.
3		0900	115	0.000	0.000	0.000	29.
3		0930	116	0.000	0.000	0.000	23.
3		1000	117	0.000	0.000	0.000	18.
3		1030	118	0.000	0.000	0.000	15.
3		1100	119	0.000	0.000	0.000	15.
3		1130	120	0.000	0.000	0.000	15.
3		1200	121	0.000	0.000	0.000	15.
3		1230	122	0.000	0.000	0.000	15.
3		1300	123	0.000	0.000	0.000	15.
3		1330	124	0.000	0.000	0.000	15.
3		1400	125	0.000	0.000	0.000	15.
3		1430	126	0.000	0.000	0.000	15.
3		1500	127	0.000	0.000	0.000	15.
3		1530	128	0.000	0.000	0.000	15.
3		1600	129	0.000	0.000	0.000	15.
3		1630	130	0.000	0.000	0.000	15.
3		1700	131	0.000	0.000	0.000	15.
3		1730	132	0.000	0.000	0.000	15.
3		1800	133	0.000	0.000	0.000	15.
3		1830	134	0.000	0.000	0.000	15.
3		1900	135	0.000	0.000	0.000	15.
3		1930	136	0.000	0.000	0.000	15.
3		2000	137	0.000	0.000	0.000	15.
3		2030	138	0.000	0.000	0.000	15.
3		2100	139	0.000	0.000	0.000	15.
3		2130	140	0.000	0.000	0.000	15.
3		2200	141	0.000	0.000	0.000	15.
3		2230	142	0.000	0.000	0.000	15.
3		2300	143	0.000	0.000	0.000	15.
3		2330	144	0.000	0.000	0.000	15.
4		0000	145	0.000	0.000	0.000	15.
4		0030	146	0.000	0.000	0.000	15.
4		0100	147	0.000	0.000	0.000	15.
4		0130	148	0.000	0.000	0.000	15.
4		0200	149	0.000	0.000	0.000	15.
4		0230	150	0.000	0.000	0.000	15.
4		0300	151	0.000	0.000	0.000	15.
4		0330	152	0.000	0.000	0.000	15.
4		0400	153	0.000	0.000	0.000	15.
4		0430	154	0.000	0.000	0.000	15.
4		0500	155	0.000	0.000	0.000	15.
4		0530	156	0.000	0.000	0.000	15.
4		0600	157	0.000	0.000	0.000	15.
4		0630	158	0.000	0.000	0.000	15.
4		0700	159	0.000	0.000	0.000	15.
4		0730	160	0.000	0.000	0.000	15.
4		0800	161	0.000	0.000	0.000	15.
4		0830	162	0.000	0.000	0.000	15.
4		0900	163	0.000	0.000	0.000	15.
4		0930	164	0.000	0.000	0.000	15.
4		1000	165	0.000	0.000	0.000	15.
4		1030	166	0.000	0.000	0.000	15.
4		1100	167	0.000	0.000	0.000	15.
4		1130	168	0.000	0.000	0.000	15.

2	1030	70	0.16	0.07	0.09	381.	*	4	1230	170	0.0	0.0	0.0	15.
2	1100	71	0.16	0.07	0.09	425.	*	4	1300	171	0.0	0.0	0.0	15.
2	1130	72	0.16	0.07	0.09	459.	*	4	1330	172	0.0	0.0	0.0	15.
2	1200	73	0.16	0.07	0.09	495.	*	4	1400	173	0.0	0.0	0.0	15.
2	1230	74	0.99	0.07	0.92	542.	*	4	1430	174	0.0	0.0	0.0	15.
2	1300	75	0.99	0.07	0.92	667.	*	4	1500	175	0.0	0.0	0.0	15.
2	1330	76	1.19	0.06	1.12	909.	*	4	1530	176	0.0	0.0	0.0	15.
2	1400	77	1.19	0.06	1.12	1319.	*	4	1600	177	0.0	0.0	0.0	15.
2	1430	78	1.49	0.06	1.42	1893.	*	4	1630	178	0.0	0.0	0.0	15.
2	1500	79	1.49	0.06	1.42	2609.	*	4	1700	179	0.0	0.0	0.0	15.
2	1530	80	1.81	0.06	1.74	3416.	*	4	1730	180	0.0	0.0	0.0	15.
2	1600	81	5.74	0.06	5.67	4466.	*	4	1800	181	0.0	0.0	0.0	15.
2	1630	82	1.39	0.06	1.32	5693.	*	4	1830	182	0.0	0.0	0.0	15.
2	1700	83	1.39	0.06	1.32	7075.	*	4	1900	183	0.0	0.0	0.0	15.
2	1730	84	1.09	0.06	1.02	8525.	*	4	1930	184	0.0	0.0	0.0	15.
2	1800	85	1.09	0.06	1.02	9627.	*	4	2000	185	0.0	0.0	0.0	15.
2	1830	86	0.09	0.07	0.01	10323.	*	4	2030	186	0.0	0.0	0.0	15.
2	1900	87	0.09	0.07	0.01	10401.	*	4	2100	187	0.0	0.0	0.0	15.
2	1930	88	0.09	0.07	0.01	9990.	*	4	2130	188	0.0	0.0	0.0	15.
2	2000	89	0.09	0.07	0.01	9150.	*	4	2200	189	0.0	0.0	0.0	15.
2	2030	90	0.09	0.07	0.01	8012.	*	4	2230	190	0.0	0.0	0.0	15.
2	2100	91	0.09	0.07	0.01	6672.	*	4	2300	191	0.0	0.0	0.0	15.
2	2130	92	0.09	0.07	0.01	5444.	*	4	2330	192	0.0	0.0	0.0	15.
2	2200	93	0.09	0.07	0.01	4385.	*	5	0000	193	0.0	0.0	0.0	15.
2	2230	94	0.09	0.07	0.01	3501.	*	5	0030	194	0.0	0.0	0.0	15.
2	2300	95	0.09	0.07	0.01	2767.	*	5	0100	195	0.0	0.0	0.0	15.
2	2330	96	0.09	0.07	0.01	2195.	*	5	0130	196	0.0	0.0	0.0	15.
3	0000	97	0.0	0.0	0.0	1751.	*	5	0200	197	0.0	0.0	0.0	15.
3	0030	98	0.0	0.0	0.0	1402.	*	5	0230	198	0.0	0.0	0.0	15.
3	0100	99	0.0	0.0	0.0	1121.	*	5	0300	199	0.0	0.0	0.0	15.
3	0130	100	0.0	0.0	0.0	898.	*	5	0330	200	0.0	0.0	0.0	15.
							*			SUM	25.13	4.74	20.39	

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	99.50-HR
10401.	43.00	(CFS)	7950.	2728.	929.	676.
		(INCHES)	14.783	20.288	20.723	20.851
		(AC-FT)	3942.	5410.	5526.	5560.

CUMULATIVE AREA = 5.00 SQ MI

HYDROGRAPH AT STATION A6
PLAN 1, RATIO = 1.00

DA MON HRMN		ORD	FLOW	*	DA MON HRMN		ORD	FLOW	*	DA MON HRMN		ORD	FLOW	*	DA MON HRMN		ORD	FLOW
1	0000	1	15.	*	2	0100	51	27.	*	3	0200	101	717.	*	4	0300	151	15.
1	0030	2	15.	*	2	0130	52	24.	*	3	0230	102	573.	*	4	0330	152	15.
1	0100	3	15.	*	2	0200	53	22.	*	3	0300	103	458.	*	4	0400	153	15.
1	0130	4	15.	*	2	0230	54	21.	*	3	0330	104	366.	*	4	0430	154	15.
1	0200	5	15.	*	2	0300	55	20.	*	3	0400	105	291.	*	4	0500	155	15.
1	0230	6	15.	*	2	0330	56	19.	*	3	0430	106	231.	*	4	0530	156	15.
1	0300	7	15.	*	2	0400	57	18.	*	3	0500	107	185.	*	4	0600	157	15.
1	0330	8	15.	*	2	0430	58	17.	*	3	0530	108	149.	*	4	0630	158	15.
1	0400	9	15.	*	2	0500	59	17.	*	3	0600	109	119.	*	4	0700	159	15.
1	0430	10	15.	*	2	0530	60	16.	*	3	0630	110	95.	*	4	0730	160	15.
1	0500	11	15.	*	2	0600	61	16.	*	3	0700	111	75.	*	4	0800	161	15.
1	0530	12	15.	*	2	0630	62	20.	*	3	0730	112	58.	*	4	0830	162	15.
1	0600	13	15.	*	2	0700	63	21.	*	3	0800	113	43.	*	4	0900	163	15.
1	0630	14	15.	*	2	0730	64	54.	*	3	0830	114	31.	*	4	0930	164	15.
1	[illegible]	15	15.	*	2	[illegible]	65	[illegible]	*	3	0900	115	[illegible]	*	4	1000	165	15.

1	0730	16	15.	2	0830	66	146.	3	0930	116	21.	4	1030	166	15.
1	0800	17	15.	2	0900	67	207.	3	1000	117	18.	4	1100	167	15.
1	0830	18	15.	2	0930	68	269.	3	1030	118	16.	4	1130	168	15.
1	0900	19	15.	2	1000	69	326.	3	1100	119	16.	4	1200	169	15.
1	0930	20	15.	2	1030	70	381.	3	1130	120	16.	4	1230	170	15.
1	1000	21	15.	2	1100	71	425.	3	1200	121	16.	4	1300	171	15.
1	1030	22	15.	2	1130	72	459.	3	1230	122	15.	4	1330	172	15.
1	1100	23	15.	2	1200	73	495.	3	1300	123	15.	4	1400	173	15.
1	1130	24	15.	2	1230	74	542.	3	1330	124	15.	4	1430	174	15.
1	1200	25	15.	2	1300	75	667.	3	1400	125	15.	4	1500	175	15.
1	1230	26	15.	2	1330	76	909.	3	1430	126	15.	4	1530	176	15.
1	1300	27	15.	2	1400	77	1319.	3	1500	127	15.	4	1600	177	15.
1	1330	28	16.	2	1430	78	1808.	3	1530	128	15.	4	1630	178	15.
1	1400	29	15.	2	1500	79	2609.	3	1600	129	15.	4	1700	179	15.
1	1430	30	15.	2	1530	80	3416.	3	1630	130	15.	4	1730	180	15.
1	1500	31	15.	2	1600	81	4466.	3	1700	131	15.	4	1800	181	15.
1	1530	32	19.	2	1630	82	5693.	3	1730	132	15.	4	1830	182	15.
1	1600	33	22.	2	1700	83	7075.	3	1800	133	15.	4	1900	183	15.
1	1630	34	34.	2	1730	84	8525.	3	1830	134	15.	4	1930	184	15.
1	1700	35	59.	2	1800	85	9687.	3	1900	135	15.	4	2000	185	15.
1	1730	36	91.	2	1830	86	10323.	3	1930	136	15.	4	2030	186	15.
1	1800	37	122.	2	1900	87	10401.	3	2000	137	15.	4	2100	187	15.
1	1830	38	141.	2	1930	88	9990.	3	2030	138	15.	4	2130	188	15.
1	1900	39	148.	2	2000	89	9150.	3	2100	139	15.	4	2200	189	15.
1	1930	40	145.	2	2030	90	8012.	3	2130	140	15.	4	2230	190	15.
1	2000	41	133.	2	2100	91	6672.	3	2200	141	15.	4	2300	191	15.
1	2030	42	117.	2	2130	92	5444.	3	2230	142	15.	4	2330	192	15.
1	2100	43	96.	2	2200	93	4325.	3	2300	143	15.	5	0000	193	15.
1	2130	44	78.	2	2230	94	3501.	3	2330	144	15.	5	0030	194	15.
1	2200	45	64.	2	2300	95	2767.	4	0000	145	15.	5	0100	195	15.
1	2230	46	53.	2	2330	96	2195.	4	0030	146	15.	5	0130	196	15.
1	2300	47	45.	3	0000	97	1751.	4	0100	147	15.	5	0200	197	15.
1	2330	48	39.	3	0030	98	1402.	4	0130	148	15.	5	0230	198	15.
2	0000	49	34.	3	0100	99	1121.	4	0200	149	15.	5	0300	199	15.
2	0030	50	30.	3	0130	100	898.	4	0230	150	15.	5	0330	200	15.

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	99.50-HR
10401.	43.00	(CFS)	7950.	2721.	929.	676.
		(INCHES)	14.783	20.280	20.723	20.851
		(AC-FT)	3942.	5410.	5526.	5560.

CUMULATIVE AREA = 5.00 SQ MI

46 KK 47 COMBINE HYDROGRAPHS TO GET TOTAL INFLOW TO BLAIR LAKE

47 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

HYDROGRAPH AT STATION X7
SUM OF 2 HYDROGRAPHS
PLAN 1, RATIO = 1.00

DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW	DA	MON	HRMN	ORD	FLOW
1		0000	1	15.	2		0100	51	66.	3		0200	101	2442.	4		0300	151	27.
1		0030	2	15.	2		0130	52	79.	3		0230	102	1996.	4		0330	152	27.
1		0100	3	15.	2		0200	53	73.	3		0300	103	1624.	4		0400	153	27.
1		0130	4	15.	2		0230	54	67.	3		0330	104	1321.	4		0430	154	27.
1		0200	5	17.	2		0300	55	63.	3		0400	105	1063.	4		0500	155	27.
1		0230	6	18.	2		0330	56	59.	3		0430	106	819.	4		0530	156	27.
1		0300	7	19.	2		0400	57	55.	3		0500	107	620.	4		0600	157	27.
1		0330	8	21.	2		0430	58	52.	3		0530	108	499.	4		0630	158	27.
1		0400	9	22.	2		0500	59	50.	3		0600	109	412.	4		0700	159	27.
1		0430	10	22.	2		0530	60	48.	3		0630	110	341.	4		0730	160	27.
1		0500	11	23.	2		0600	61	46.	3		0700	111	279.	4		0800	161	27.
1		0530	12	23.	2		0630	62	47.	3		0730	112	227.	4		0830	162	27.
1		0600	13	24.	2		0700	63	57.	3		0800	113	183.	4		0900	163	27.
1		0630	14	24.	2		0730	64	79.	3		0830	114	145.	4		0930	164	27.
1		0700	15	25.	2		0800	65	110.	3		0900	115	118.	4		1000	165	27.
1		0730	16	25.	2		0830	66	173.	3		0930	116	99.	4		1030	166	27.
1		0800	17	25.	2		0900	67	290.	3		1000	117	85.	4		1100	167	27.
1		0830	18	25.	2		0930	69	332.	3		1030	118	75.	4		1130	168	27.
1		0900	19	25.	2		1000	69	452.	3		1100	119	68.	4		1200	169	27.
1		0930	20	26.	2		1030	70	593.	3		1130	120	62.	4		1230	170	27.
1		1000	21	26.	2		1100	71	725.	3		1200	121	58.	4		1300	171	27.
1		1030	22	26.	2		1130	72	853.	3		1230	122	54.	4		1330	172	27.
1		1100	23	26.	2		1200	73	973.	3		1300	123	50.	4		1400	173	27.
1		1130	24	26.	2		1230	74	1053.	3		1330	124	48.	4		1430	174	27.
1		1200	25	26.	2		1300	75	1235.	3		1400	125	46.	4		1500	175	27.
1		1230	26	26.	2		1330	76	1506.	3		1430	126	44.	4		1530	176	27.
1		1300	27	27.	2		1400	77	2123.	3		1500	127	42.	4		1600	177	27.
1		1330	28	27.	2		1430	78	2963.	3		1530	128	40.	4		1630	178	27.
1		1400	29	27.	2		1500	79	4037.	3		1600	129	38.	4		1700	179	27.
1		1430	30	27.	2		1530	80	5419.	3		1630	130	36.	4		1730	180	27.
1		1500	31	27.	2		1600	81	7267.	3		1700	131	35.	4		1800	181	27.
1		1530	32	27.	2		1630	82	9540.	3		1730	132	34.	4		1830	182	27.
1		1600	33	34.	2		1700	83	12219.	3		1800	133	33.	4		1900	183	27.
1		1630	34	49.	2		1730	84	15100.	3		1830	134	32.	4		1930	184	27.
1		1700	35	72.	2		1800	85	17952.	3		1900	135	31.	4		2000	185	27.
1		1730	36	106.	2		1830	86	20114.	3		1930	136	31.	4		2030	186	27.
1		1800	37	139.	2		1900	87	21396.	3		2000	137	30.	4		2100	187	27.
1		1830	38	165.	2		1930	88	21537.	3		2030	138	29.	4		2130	188	27.
1		1900	39	183.	2		2000	89	20747.	3		2100	139	29.	4		2200	189	27.
1		1930	40	196.	2		2030	90	19138.	3		2130	140	29.	4		2230	190	27.
1		2000	41	206.	2		2100	91	16516.	3		2200	141	28.	4		2300	191	27.
1		2030	42	213.	2		2130	92	14505.	3		2230	142	28.	4		2330	192	27.
1		2100	43	218.	2		2200	93	12159.	3		2300	143	28.	5		0000	193	27.
1		2130	44	219.	2		2230	94	10047.	3		2330	144	28.	5		0030	194	27.
1		2200	45	216.	2		2300	95	8217.	4		0000	145	28.	5		0100	195	27.
1		2230	46	162.	2		2330	96	6700.	4		0030	146	27.	5		0130	196	27.
1		2300	47	146.	3		0000	97	5462.	4		0100	147	27.	5		0200	197	27.
1		2330	48	121.	3		0030	98	4461.	4		0130	148	27.	5		0230	198	27.
2		0000	49	104.	3		0100	99	3646.	4		0200	149	27.	5		0300	199	27.
2		0030	50	95.	3		0130	100	2984.	4		0230	150	27.	5		0330	200	27.

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW	6-HR	24-HR	72-HR	99.50-HR
21537.	43.50	(CFS)	14800.	5430.	2019.	1468.
		(INCHES)	14.838	20.252	20.662	20.759
		(AC-FT)	8081.	11761.	12012.	12066.

CUMULATIVE AREA = 10.90 SQ MI

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              ***************
              *             *
46 KK         *     AB      *      ROUTE INFLOW HYDROGRAPH THROUGH BLAIR LAKE
              *             *
              ***************

              HYDROGRAPH ROUTING DATA

45 RS         STORAGE ROUTING
                   NSTPS           1   NUMBER OF SUBREACHES
                   ITYP         STOR   TYPE OF INITIAL CONDITION
                  RSVRIC       24.00   INITIAL CONDITION
                       X         0.0   WORKING R AND D COEFFICIENT
```

52 SV	STORAGE	0.0	24.0	30.0	40.0	60.0	80.0	109.0	142.0	193.0	235.0
53 SE	ELEVATION	340.70	355.00	356.00	357.00	359.00	361.00	363.00	365.20	368.00	370.00
56 SQ	DISCHARGE	0.	0.	123.	348.	984.	2253.	4122.	6748.	13345.	21421.
51 SE	ELEVATION	340.70	355.00	356.00	357.00	359.00	361.00	363.00	365.20	368.00	370.00

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54 SS         SPILLWAY
                    CREL      355.00   SPILLWAY CREST ELEVATION
                   SPWID       41.00   SPILLWAY WIDTH
                   COQW        3.00    WEIR COEFFICIENT
                   EXPW        1.50    EXPONENT OF HEAD

55 ST         TOP OF DAM
                   TOPEL      359.00   ELEVATION AT TOP OF DAM
                  DAMWID       53.00   DAM WIDTH
                   COQD         0.0    WEIR COEFFICIENT
                   EXPD         1.50   EXPONENT OF HEAD
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COMPUTED STORAGE-OUTFLOW CURVE

STORAGE	0.0	24.00	30.00	40.00	60.00	80.00	109.00	142.00	193.00	235.00
OUTFLOW	0.0	0.0	123.00	348.00	984.00	2253.00	4122.00	6748.00	13345.00	21421.00

****

HYDROGRAPH AT STATION AB
PLAN 1, RATIO = 1.00

****

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAG
1		0000	1	0.	24.0	355.0	*	2		0930	68	245.	35.4	356.5	*	3		1900	135	32.	25.6	[illegible]
1		0030	2	0.	24.4	355.1	*	2		1000	69	339.	39.6	357.0	*	3		1930	136	31.	25.5	[illegible]
1		0100	3	15.	24.6	355.1	*	2		1030	70	[illegible]	44.2	357.4	*	3		2000	137	31.	25.5	[illegible]
1		0130	4	16.	24.7	355.1	*	2		1100	71	[illegible]	[illegible]	357.9	*	3		2030	138	30.	25.5	[illegible]
1		0200	5	16.	[illegible]	355.1	*	2		1130	72	[illegible]	52.7	358.3	*	3		2100	139	30.	25.4	[illegible]
1		0230	6	17.	[illegible]	355.1	*	2		1200	73	[illegible]	56.2	358.6	*	3		2130	140	29.	25.4	[illegible]
1		[illegible]	7	17.	[illegible]	[illegible]	*	2		[illegible]	74	[illegible]	[illegible]	[illegible]	*	3		2200	141	29.	25.4	[illegible]

PEAK OUTFLOW IS 21754. AT TIME 43.50 HOURS

PEAK FLOW (CFS)	TIME (HR)		6-HR	MAXIMUM AVERAGE FLOW 24-HR	72-HR	99.50-HR
21754.	43.50	(CFS)	16756.	5020.	2019.	1467.
		(INCHES)	14.513	25.622	20.662	20.756
		(AC-FT)	8321.	11760.	12011.	12066.

PEAK STORAGE (AC-FT)	TIME (HR)	6-HR	MAXIMUM AVERAGE STORAGE 24-HR	72-HR	99.50-HR
236.	43.50	210.	106.	54.	46.

PEAK STAGE (FEET)	TIME (HR)	6-HR	MAXIMUM AVERAGE STAGE 24-HR	72-HR	99.50-HR
370.03	43.50	368.74	362.20	357.73	357.02

CUMULATIVE AREA = 10.90 SQ MI

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIO 1 / RATIOS APPLIED TO FLOWS 1.00
HYDROGRAPH AT	A1	5.90	1	FLOW	12000.
				TIME	43.00
ROUTED TO	A2	5.90	1	FLOW	11942.
				TIME	43.50
			** PEAK STAGES IN FEET **		
			1	STAGE	110.53
				TIME	43.00
ROUTED TO	A3	5.90	1	FLOW	11930.
				TIME	43.00
			** PEAK STAGES IN FEET **		
			1	STAGE	13.14
				TIME	43.00
ROUTED TO	A4	5.90	1	FLOW	11910.
				TIME	43.00
			** PEAK STAGES IN FEET **		
			1	STAGE	15.31
				TIME	43.00
ROUTED TO	A5	5.90	1	FLOW	11597.
				TIME	44.00
			** PEAK STAGES IN FEET **		
			1	STAGE	14.33
				TIME	44.00
HYDROGRAPH AT	A6	5.00	1	FLOW	10401.
				TIME	43.00
2 COMBINED AT	A7	10.90	1	FLOW	21937.
				TIME	43.50
ROUTED TO	A8	10.90	1	FLOW	21554.
				TIME	43.50
			** PEAK STAGES IN FEET **		
			1	STAGE	370.83
				TIME	43.50

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION A6

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	355.00	355.00	359.00
STORAGE	24.	24.	60.
OUTFLOW	0.	0.	984.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	370.03	11.03	236.	21554.	15.50	43.50	0.0

*** NORMAL END OF JOB ***

APPENDIX 5

REFERENCES

BLAIR LAKE DAM

APPENDIX 5
REFERENCES

BLAIR LAKE DAM

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